



United States  
Department of  
Agriculture



Natural  
Resources  
Conservation  
Service

In cooperation with  
University of Nebraska,  
Conservation and Survey  
Division; South Platte  
Natural Resources District;  
and Deuel County Board of  
Commissioners

# Soil Survey of Deuel County, Nebraska





# How To Use This Soil Survey

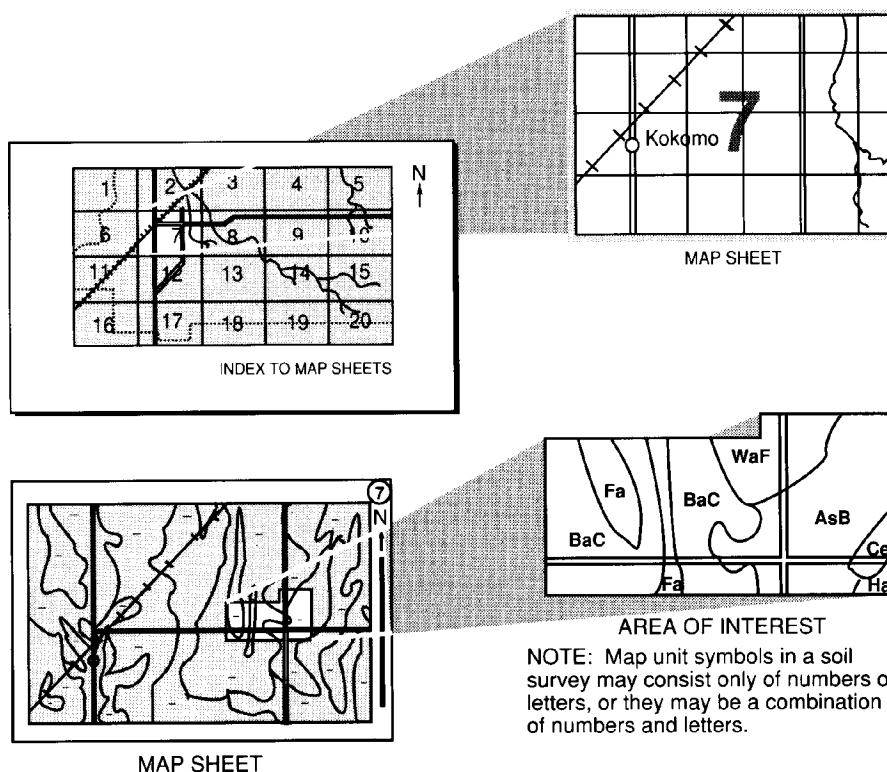
## Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



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This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1998. Soil names and descriptions were approved in 2000. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1998. This survey was made cooperatively by the Natural Resources Conservation Service and the University of Nebraska, Conservation and Survey Division. It is part of the technical assistance furnished to the South Platte Natural Resources District and Deuel County. The Conservation and Survey Division provided a soil scientist to assist with the field mapping.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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**Cover: Harvesting winter wheat on the tableland in Deuel County.**

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# Foreword

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This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

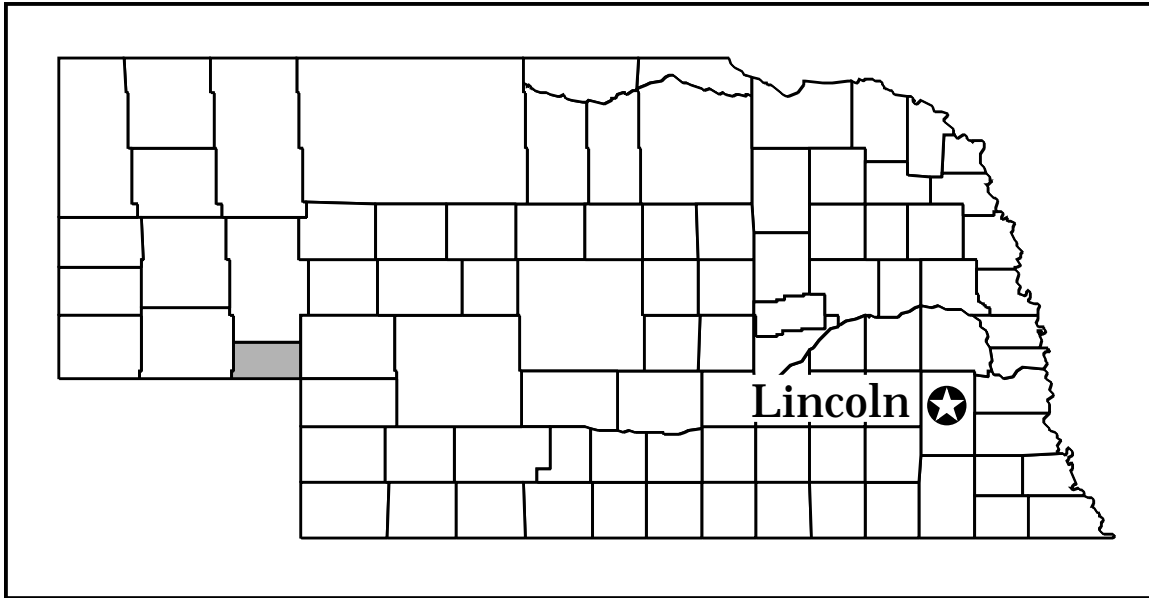
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land user identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Stephen K. Chick  
State Conservationist  
Natural Resources Conservation Service



Location of Deuel County in Nebraska.

# Soil Survey of Deuel County, Nebraska

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Fieldwork by Jay Wilson and Alan Stuebe, Natural Resources Conservation Service,  
and Phil Young, University of Nebraska

United States Department of Agriculture, Natural Resources Conservation Service,  
in cooperation with  
the Conservation and Survey Division, University of Nebraska; the South Platte Natural  
Resources District; and the Deuel County Board of Commissioners

DEUEL COUNTY is in the southeast corner of the panhandle of Nebraska. It has a total area of 282,093 acres. It is bordered on the north by Garden County, on the east by Keith County, on the west by Cheyenne County, and on the south by Sedgwick County in Colorado.

## General Nature of the County

The following paragraphs provide general information about Deuel County. They describe history and development; physiography, drainage, and relief; and climate.

## History and Development

The area that is now Deuel County was part of the hunting grounds of the Ogallala and Brule Indians, the two most powerful bands of the Teton Sioux. In 1834, the land in the region was set aside by the U.S. Government for the Indians. The first white settlers arrived in the area in 1850. Until 1861, when the telegraph was built through the region, communication with the outside was limited to the Pony Express.

The Union Pacific Railroad reached Deuel County in 1868. It followed the trail blazed by the trappers and gold seekers who passed through on the Oregon Trail. The railroad stimulated settlement in the area, especially in the southern part of the county along Lodgepole Creek and the South Platte River. The army posts that were established to protect the

railroad crews from the Indians were partly responsible for the push of settlers into the county.

After crops were grown successfully in the area, homesteaders settled on the tablelands in the north-central part of the county. Some of the first settlers were a group of Swedish immigrants who settled at Froid in 1884. They built a church of sod in 1886, and the church served as a school house for 3 months of the year. But the town of Froid did not last, and the area later became part of Garden County.

In 1888, Deuel County was organized from part of Cheyenne County. Deuel County lost three-fourths of its original territory in the 1909 election, when Garden County was formed from the northern part.

As late as 1884, Chappell was only a railroad siding with a station house. During that year the town was surveyed and laid out, but few people settled permanently. Chappell was not incorporated until 1907, and even then it was difficult to find the 200 people required for incorporation. The town has always been considered the county seat, but a series of elections and lawsuits were needed before it was designated in 1894.

Big Springs, the only other town in the county, got its name from a nearby spring that furnished water for settlers. Although it was settled before Chappell, the town was not surveyed by the Union Pacific Railroad until 3 months after Chappell was laid out. Big Springs did not become a town until 1917.

The population of Deuel County and of Chappell has been slowly on the decline since 1920. In 1920,

the population of the county was 3,282; in 1990, it was 2,237. The population of Chappell was 1,131 in 1920 and 979 in 1990. Big Springs, however, had 408 people in 1920 and 495 in 1990.

Farming and ranching are the main agricultural enterprises in the county. Farming consists mainly of the production of dryland winter wheat (about 87,000 acres) in a wheat-fallow rotation.

Other dryland crops, such as millet, sunflowers, and corn, are produced on about 25,000 acres in the county. Most irrigated acres are used for production of corn.

Deuel County consists of nearly level loess-covered tablelands dissected by Lodgepole Creek and the South Platte River and their tributaries. The soils on the tablelands are generally silty to loamy, and those on valley sides are loamy to sandy and gravelly. The soils on valley floors are silty to sandy. The depth to ground water and the affects of salinity and alkalinity vary in these soils.

The Union Pacific Railroad enters the county from the east, follows the South Platte River into Colorado, and reenters the county in Lodgepole Creek Valley. It passes through Chappell and exits on the western side of the county.

U.S. Highway 30 extends from east to west across the county and passes through Chappell. State Highway 138 follows the South Platte River in the southeast corner of the county. Interstate 80 enters near the southeast corner and exits west of Chappell. U.S. Highway 385 extends from Chappell and enters Colorado in the south-central part of the county. County roads are on most section lines and are maintained with gravel surfaces.

This soil survey updates the survey of Deuel County published in 1965 (USDA, 1965). It provides data that are consistent with modern soil surveys in Nebraska and adjoining states.

## Physiography, Drainage, and Relief

Deuel County is in the Central High Tablelands Major Land Resource Area of the Central Great Plains Region. The dominant physiographic feature is a level to gently sloping tableland. The tableland is dissected with drainageways and the valleys of the South Platte River and Lodgepole Creek.

On the tablelands where drainage patterns are not well defined, rainwater drains into depressions that occasionally become ponded.

The South Platte River flows northeast across the southeast corner of the county. The South Platte River valley consists of flood plains and stream terraces.

The flood plains have low relief and are adjacent to the river stream channels. The soils on flood plains commonly have a seasonal high water table and are subject to flooding. The stream terraces are commonly above the flood plains and at the base of the uplands. The soils on stream terraces have low relief and generally are well drained. The main tributaries of the South Platte River and Lodgepole Creek are Sand Draw, O'Neil Draw, Walrath Draw, and Dry Creek.

Lodgepole Creek, a perennial stream, enters the county at about the midpoint of the western side, flows southeast, and leaves the county at about the midpoint of the southwest side. Lodgepole Creek joins the South Platte River south of the Deuel County line in Sedgwick County, Colorado. Adjacent to the valley of Lodgepole Creek in the south-central part of the county is an area of sandhills 1 to 2 miles wide extending about 7 miles northwest from the Colorado line.

The general slope of the land is toward the southeast, and all of the drainageways flow in this general direction. The elevation in the county ranges from about 3,370 feet at Big Springs to 3,970 feet in the northwestern part of the county. The tablelands are 200 to 300 feet higher than the valley floors. Perennial streams fall at a rate of about 7 to 10 feet per mile.

## Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Big Springs in the period 1961 to 1990. Table 2 provides data on length of the growing season. Table 3 shows probable dates of the first freeze in fall and the last freeze in spring.

In winter, the average temperature is 27 degrees F and the average daily minimum temperature is 13 degrees. In summer, the average temperature is 72 degrees and the average daily maximum temperature is 86 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 17 inches. Of this, 13 inches, or 77 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 13.74 inches. The average seasonal snowfall is about 14 inches. On the average, 32 days of the year have at

least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey

area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Table 1.--Temperature and Precipitation  
(Recorded in the period 1961-90 at Big Springs, Nebraska.)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum	Minimum			Less	More		
				temperature higher than--	temperature lower than--			than--	than--		
	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>Units</u>	<u>In</u>	<u>In</u>	<u>In</u>		<u>In</u>
January----	38.1	11.0	24.5	65	-20	7	0.38	0.19	0.65	1	2.1
February---	44.0	15.9	29.9	72	-14	24	.38	.13	.64	1	2.3
March-----	51.8	24.0	37.9	81	-2	96	1.23	.38	1.92	2	3.7
April-----	63.4	33.9	48.6	88	12	279	1.88	.94	2.81	4	1.6
May-----	71.9	44.5	58.2	92	26	547	3.36	1.67	4.83	6	.1
June-----	81.9	53.9	67.9	101	37	801	2.95	1.37	4.31	5	.0
July-----	88.9	60.2	74.6	103	47	1,044	2.14	1.26	2.92	5	.0
August-----	86.5	57.5	72.0	100	42	929	1.61	.67	2.41	3	.0
September--	77.2	47.0	62.1	96	28	627	1.12	.28	1.85	2	.0
October----	66.1	34.7	50.4	89	18	325	.77	.34	1.36	1	.1
November---	51.3	22.7	37.0	76	1	72	.57	.15	.98	1	2.3
December---	40.2	12.9	26.6	68	-18	12	.50	.14	.85	1	2.0
Yearly:											
Average---	63.4	34.9	49.1	---	---	---	---	---	---	---	---
Extreme---	106	-37	---	103	-24	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,764	16.88	13.74	19.49	32	14.3

\* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Growing Season

(The dates in this table refer to the probable beginning and ending of the growing season. The number of days refers to the probable length of the growing season.)

Probability	Temperature		
	24 °F or higher	28 °F or higher	32 °F or higher
50 percent	4/13 to 10/15 185 days	4/24 to 10/9 168 days	5/8 to 9/30 145 days
70 percent	4/9 to 10/19 193 days	4/20 to 10/13 176 days	5/3 to 10/4 154 days

Table 3.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Big Springs, Nebraska.)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 29	May 9	May 24
2 years in 10 later than--	Apr. 24	May 4	May 18
5 years in 10 later than--	Apr. 14	Apr. 24	May 8
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 3	Sept. 25	Sept. 15
2 years in 10 earlier than--	Oct. 8	Sept. 30	Sept. 20
5 years in 10 earlier than--	Oct. 17	Oct. 10	Sept. 29



# Detailed Soil Map Units

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The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting minor components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Las Animas loam, 0 to 1 percent slopes, occasionally flooded, is a phase of the Las Animas series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alliance-Rosebud loams, 1 to 3 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not

uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Gothenburg soils, 0 to 1 percent slopes, occasionally flooded, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, sand and gravel, is an example.

In the descriptions, "LEP" means linear extensibility percent.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see Contents) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

### **1130—Alliance loam, 0 to 1 percent slopes**

#### ***Map Unit Composition***

Alliance and similar soils: 90 percent

Minor components: 10 percent

#### ***Component Descriptions***

##### **Alliance**

*MLRA*: 72—Central High Tableland

*Landform*: Plain on tableland

*Parent material*: Loess over sandstone

*Slope*: 0 to 1 percent

*Depth to restrictive feature*: 40 to 60 inches to bedrock (paralithic)

*Drainage class*: Well drained

*Slowest permeability*: Moderately slow (about 0.20 in/hr)

*Available water capacity*: Moderate (about 8.6 inches)

*Shrink-swell potential*: Moderate (about 4.5 LEP)

*Flooding hazard*: None

*Depth to seasonal zone of saturation*: Greater than 6 feet

*Runoff class*: Negligible

*Ecological site*: Silty; Veg. Zone 2

*Land capability (irrigated)*: 1-4

*Land capability (nonirrigated)*: 2c

##### ***Typical profile***:

Ap—0 to 6 inches; loam

Bt1—6 to 17 inches; clay loam

Bt2—17 to 24 inches; loam

BCK—24 to 34 inches; loam

C1—34 to 47 inches; very fine sandy loam

2C2—47 to 54 inches; loamy fine sand

2Cr—54 to 80 inches; weathered bedrock

### **Minor components**

Rosebud and similar soils

*Slope*: 0 to 1 percent

*Depth to restrictive feature*: 20 to 40 inches to bedrock (paralithic)

*Drainage class*: Well drained

*Ecological site*: Silty; Veg. Zone 2

#### ***Major Uses***

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

### **1146—Alliance-Rosebud loams, 1 to 3 percent slopes**

#### ***Map Unit Composition***

Alliance and similar soils: 65 percent

Rosebud and similar soils: 25 percent

Minor components: 10 percent

#### ***Component Descriptions***

##### **Alliance**

*MLRA*: 72—Central High Tableland

*Landform*: Plain on tableland

*Parent material*: Loess over sandstone

*Slope*: 1 to 3 percent

*Depth to restrictive feature*: 40 to 60 inches to bedrock (paralithic)

*Drainage class*: Well drained

*Slowest permeability*: Moderately slow (about 0.20 in/hr)

*Available water capacity*: Moderate (about 7.8 inches)

*Shrink-swell potential*: Moderate (about 4.5 LEP)

*Flooding hazard*: None

*Depth to seasonal zone of saturation*: Greater than 6 feet

*Runoff class*: Low

*Ecological site*: Silty; Veg. Zone 2

*Land capability (irrigated)*: 2e-4

*Land capability (nonirrigated)*: 2e

##### ***Typical profile***:

Ap—0 to 6 inches; loam

Bt1—6 to 14 inches; clay loam

Bt2—14 to 19 inches; clay loam

Bk—19 to 25 inches; loam

C—25 to 45 inches; very fine sandy loam

Cr—45 to 60 inches; weathered bedrock

##### **Rosebud**

*MLRA*: 72—Central High Tableland

*Landform*: Plain on tableland

*Parent material:* Loess over sandstone  
*Slope:* 1 to 3 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* Low (about 5.3 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 3e-7  
*Land capability (nonirrigated):* 3e  
*Typical profile:*  
     Ap—0 to 6 inches; loam  
     Bt1—6 to 11 inches; clay loam  
     Bt2—11 to 17 inches; clay loam  
     BCk—17 to 23 inches; loam  
     C—23 to 30 inches; very fine sandy loam  
     Cr—30 to 80 inches; weathered bedrock

#### Minor components

Canyon and similar soils  
*Slope:* 1 to 3 percent  
*Depth to restrictive feature:* 6 to 20 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Shallow Limy; Veg. Zone 2

#### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

### 1198—Altvan-Eckley-Satanta complex, 3 to 9 percent slopes

#### Map Unit Composition

Altvan and similar soils: 45 percent  
 Eckley and similar soils: 30 percent  
 Satanta and similar soils: 20 percent  
 Minor components: 5 percent

#### Component Descriptions

##### Altvan

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Backslope, shoulder  
*Parent material:* Loess over alluvium

*Slope:* 3 to 9 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* Low (about 5.8 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 4e-7  
*Land capability (nonirrigated):* 4e  
*Typical profile:*  
     Ap—0 to 7 inches; fine sandy loam  
     Bt1—7 to 12 inches; loam  
     Bt2—12 to 17 inches; clay loam  
     BCk—17 to 25 inches; very fine sandy loam  
     C1—25 to 31 inches; loamy fine sand  
     2C2—31 to 80 inches; gravelly coarse sand

##### Eckley

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Shoulder, backslope  
*Parent material:* Alluvium  
*Slope:* 3 to 9 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* Low (about 3.0 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Shallow to Gravel; Veg. Zone 2  
*Land capability (nonirrigated):* 6e  
*Typical profile:*  
     Ap—0 to 5 inches; sandy loam  
     Bt—5 to 8 inches; sandy clay loam  
     BC—8 to 11 inches; gravelly sandy loam  
     2C1—11 to 15 inches; gravelly coarse sand  
     2C2—15 to 80 inches; gravelly coarse sand

##### Satanta

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Backslope, shoulder  
*Parent material:* Loess  
*Slope:* 3 to 9 percent  
*Drainage class:* Well drained

*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* Moderate (about 8.5 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 4e-4  
*Land capability (nonirrigated):* 4e

*Typical profile:*

Ap—0 to 10 inches; loam  
 Bt1—10 to 21 inches; loam  
 Bt2—21 to 30 inches; clay loam  
 BCk—30 to 37 inches; very fine sandy loam  
 C—37 to 42 inches; very fine sandy loam  
 2C1—42 to 50 inches; loamy fine sand  
 2C2—50 to 80 inches; fine sand

**Minor components**

**Broadwater**

*Extent within map unit:* About 3 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Somewhat excessively drained  
*Ecological site:* Shallow to Gravel; Veg. Zone 2

**Sarben and similar soils**

*Extent within map unit:* About 2 percent  
*Geomorphic position:* Hillside on upland  
*Slope:* 3 to 9 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

**1295—Ashollow-Tassel complex, 9 to 30 percent slopes**

**Map Unit Composition**

Ashollow and similar soils: 65 percent  
 Tassel and similar soils: 30 percent  
 Minor components: 5 percent

**Component Descriptions**

**Ashollow**

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland

*Hillslope position:* Foothslope  
*Parent material:* Sandstone residuum  
*Slope:* 9 to 17 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* High (about 10.1 inches)  
*Shrink-swell potential:* Low (about 0.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* High  
*Ecological site:* Sandy; Veg. Zone 2  
*Land capability (nonirrigated):* 6e

*Typical profile:*

A—0 to 3 inches; very fine sandy loam  
 AC—3 to 10 inches; very fine sandy loam  
 C1—10 to 32 inches; very fine sandy loam  
 C2—32 to 60 inches; very fine sandy loam

**Tassel**

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Backslope, shoulder  
*Parent material:* Sandstone residuum  
*Slope:* 9 to 30 percent  
*Depth to restrictive feature:* 6 to 20 inches to bedrock (paralithic)  
*Drainage class:* Somewhat excessively drained  
*Slowest permeability:* Moderately rapid (about 2.00 in/hr)  
*Available water capacity:* Very low (about 1.9 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Shallow Limy; Veg. Zone 2  
*Land capability (nonirrigated):* 6s

*Typical profile:*

A—0 to 4 inches; fine sandy loam  
 C1—4 to 7 inches; fine sandy loam  
 C2—7 to 18 inches; gravelly fine sandy loam  
 Cr—18 to 60 inches; weathered bedrock

**Minor components**

**Rock outcrop**

*Geomorphic position:* Hillside on upland  
*Slope:* 30 to 60 percent  
*Drainage class:* Excessively drained  
*Ecological site:* None; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used as rangeland.

**1588—Blueridge-Altvan complex, 6 to 30 percent slopes****Map Unit Composition**

Blueridge and similar soils: 50 percent

Altvan and similar soils: 35 percent

Minor components: 15 percent

**Component Descriptions****Blueridge**

MLRA: 72—Central High Tableland

Landform: Hillside on upland

Hillslope position: Backslope, shoulder

Parent material: Very old alluvium that is now part of the dissected upland

Slope: 6 to 30 percent

Drainage class: Excessively drained

Slowest permeability: Very rapid (about 20.00 in/hr)

Available water capacity: Very low (about 1.9 inches)

Shrink-swell potential: Low (about 1.5 LEP)

Flooding hazard: None

Depth to seasonal zone of saturation: Greater than 6 feet

Runoff class: Low

Ecological site: Shallow to Gravel; Veg. Zone 2

Land capability (nonirrigated): 6s

Typical profile:

A—0 to 4 inches; coarse sand

C1—4 to 40 inches; gravelly coarse sand

C2—40 to 80 inches; gravelly coarse sand

**Altvan**

MLRA: 72—Central High Tableland

Landform: Hillside on upland

Hillslope position: Shoulder, footslope

Parent material: Loess and the underlying old alluvium

Slope: 6 to 9 percent

Drainage class: Well drained

Slowest permeability: Moderately slow (about 0.20 in/hr)

Available water capacity: Moderate (about 6.5 inches)

Shrink-swell potential: Low (about 1.5 LEP)

Flooding hazard: None

Depth to seasonal zone of saturation: Greater than 6 feet

Runoff class: High

Ecological site: Silty; Veg. Zone 2

Land capability (nonirrigated): 6e

Typical profile:

Ap—0 to 7 inches; loam

Bt1—7 to 10 inches; sandy clay loam

Bt2—10 to 20 inches; sandy clay loam

BCK—20 to 24 inches; very fine sandy loam

C1—24 to 30 inches; loamy fine sand

2C2—30 to 80 inches; gravelly sand

**Minor components**

Sarben and similar soils

Extent within map unit: About 10 percent

Geomorphic position: Hillside on upland

Slope: 6 to 9 percent

Drainage class: Well drained

Ecological site: Sandy; Veg. Zone 2

Broadwater

Extent within map unit: About 5 percent

Slope: 1 to 3 percent

Drainage class: Somewhat excessively drained

Ecological site: Shallow to Gravel; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used as rangeland (fig. 1).

**1782—Broadwater loamy sand, 0 to 1 percent slopes, frequently flooded****Map Unit Composition**

Broadwater: 90 percent

Minor components: 10 percent

**Component Descriptions****Broadwater**

MLRA: 72—Central High Tableland

Landform: Flood plain on valley

Parent material: Alluvium

Slope: 0 to 1 percent

Drainage class: Somewhat excessively drained

Slowest permeability: Rapid (about 6.00 in/hr)

Available water capacity: Very low (about 2.4 inches)

Shrink-swell potential: Low (about 1.5 LEP)

Flooding hazard: Frequent

Depth to seasonal zone of saturation: Greater than 6 feet

Runoff class: Negligible

Ecological site: Shallow to Gravel; Veg. Zone 2

Land capability (nonirrigated): 6w



Figure 1.—Native pasture on Blueridge-Altvan complex, 6 to 30 percent slopes. The South Platte River valley is in the background.

*Typical profile:*

- A—0 to 3 inches; loamy sand
- C1—3 to 9 inches; loamy sand
- 2C2—9 to 32 inches; gravelly coarse sand
- 2C3—32 to 60 inches; gravelly coarse sand

**Minor components**

Chappell and similar soils

- Extent within map unit:* About 5 percent
- Slope:* 0 to 1 percent
- Drainage class:* Well drained
- Ecological site:* Sandy; Veg. Zone 2

Glenberg and similar soils

- Extent within map unit:* About 5 percent
- Slope:* 0 to 2 percent
- Drainage class:* Well drained
- Ecological site:* Sandy Lowland; Veg. Zone 1

**Major Uses**

Most areas of this map unit are used as rangeland.

**1944—Calamus sand, 0 to 1 percent slopes, very rarely flooded**

***Map Unit Composition***

Calamus and similar soils: 95 percent

Minor components: 5 percent

***Component Descriptions***

**Calamus**

- MLRA:* 72—Central High Tableland
- Landform:* Flood plain on river valley
- Parent material:* Alluvium
- Slope:* 0 to 1 percent
- Drainage class:* Moderately well drained
- Slowest permeability:* Rapid (about 6.00 in/hr)
- Available water capacity:* Low (about 3.3 inches)
- Shrink-swell potential:* Low (about 0.5 LEP)
- Flooding hazard:* Very rare
- Depth to seasonal zone of saturation:* About 36 to 72 inches

*Runoff class:* Negligible  
*Ecological site:* Sandy; Veg. Zone 2  
*Land capability (irrigated):* 4s-14  
*Land capability (nonirrigated):* 6s

*Typical profile:*

Ap—0 to 7 inches; loamy sand  
 AC—7 to 14 inches; sand  
 C1—14 to 22 inches; sand  
 C2—22 to 38 inches; sand  
 C3—38 to 58 inches; stratified gravelly coarse sand to coarse sand  
 C4—58 to 60 inches; stratified gravelly coarse sand to coarse sand

**Minor components**

Platte and similar soils  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Subirrigated; Veg. Zone 2

**Special Features**

This map unit consists of old alluvial sandbars that have been reworked by wind. The river within this map unit has become entrenched. Dams that have been built upstream reduce the hazard of flooding.

**Major Uses**

Most areas of this map unit are used as rangeland.

**2072—Chappell-Alice-Broadwater complex, 0 to 3 percent slopes**

**Map Unit Composition**

Chappell and similar soils: 38 percent  
 Alice and similar soils: 33 percent  
 Broadwater soil: 24 percent  
 Minor components: 5 percent

**Component Descriptions**

**Chappell**

*MLRA:* 72—Central High Tableland  
*Landform:* Stream terrace on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 3 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately rapid (about 2.00 in/hr)  
*Available water capacity:* Low (about 5.3 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet

*Runoff class:* Very low  
*Ecological site:* Sandy; Veg. Zone 2  
*Land capability (irrigated):* 2e-9  
*Land capability (nonirrigated):* 3e

*Typical profile:*

Ap—0 to 7 inches; fine sandy loam  
 A—7 to 17 inches; fine sandy loam  
 Bw—17 to 25 inches; fine sandy loam  
 C1—25 to 30 inches; fine sandy loam  
 2C2—30 to 60 inches; gravelly coarse sand

**Alice**

*MLRA:* 72—Central High Tableland  
*Landform:* Stream terrace on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 3 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately rapid (about 2.00 in/hr)  
*Available water capacity:* Moderate (about 7.4 inches)  
*Shrink-swell potential:* Low (about 0.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Very low  
*Ecological site:* Sandy; Veg. Zone 2  
*Land capability (irrigated):* 2e-8  
*Land capability (nonirrigated):* 3e

*Typical profile:*

Ap—0 to 8 inches; sandy loam  
 A—8 to 14 inches; sandy loam  
 Bw—14 to 19 inches; sandy loam  
 C1—19 to 33 inches; sandy loam  
 C2—33 to 80 inches; sandy loam

**Broadwater**

*MLRA:* 72—Central High Tableland  
*Landform:* Flood plain on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 3 percent  
*Drainage class:* Somewhat excessively drained  
*Slowest permeability:* Rapid (about 6.00 in/hr)  
*Available water capacity:* Very low (about 2.4 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* Occasional  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Negligible  
*Ecological site:* Shallow to Gravel; Veg. Zone 2  
*Land capability (nonirrigated):* 6w

*Typical profile:*

A—0 to 3 inches; loamy sand  
 C1—3 to 9 inches; loamy sand

2C2—9 to 32 inches; gravelly coarse sand  
2C3—32 to 60 inches; gravelly coarse sand

### Minor components

Duroc and similar soils

*Slope:* 0 to 3 percent

*Drainage class:* Well drained

*Ecological site:* Silty; Veg. Zone 2

### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## 2630—Duroc loam, 0 to 1 percent slopes

### Map Unit Composition

Duroc and similar soils: 90 percent

Minor components: 10 percent

### Component Descriptions

#### Duroc

*MLRA:* 72—Central High Tableland

*Landform:* Swale on tableland

*Parent material:* Alluvium

*Slope:* 0 to 1 percent

*Drainage class:* Well drained

*Slowest permeability:* Moderate (about 0.60 in/hr)

*Available water capacity:* High (about 11.1 inches)

*Shrink-swell potential:* Low (about 1.5 LEP)

*Flooding hazard:* None

*Depth to seasonal zone of saturation:* Greater than 6 feet

*Runoff class:* Negligible

*Ecological site:* Silty; Veg. Zone 2

*Land capability (irrigated):* 1-6

*Land capability (nonirrigated):* 2c

*Typical profile:*

Ap—0 to 6 inches; loam

A—6 to 14 inches; loam

Bw1—14 to 27 inches; loam

Bw2—27 to 32 inches; loam

Bk—32 to 42 inches; loam

C—42 to 60 inches; loam

### Minor components

Kuma and similar soils

*Extent within map unit:* About 8 percent

*Slope:* 0 to 1 percent

*Drainage class:* Well drained

*Ecological site:* Silty; Veg. Zone 2

Lodgepole and similar soils

*Extent within map unit:* About 2 percent

*Slope:* 0 to 1 percent

*Drainage class:* Somewhat poorly drained

*Ecological site:* Clayey Overflow; Veg. Zone 2

### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## 2638—Duroc loam, terrace, 0 to 1 percent slopes

### Map Unit Composition

Duroc and similar soils: 90 percent

Minor components: 10 percent

### Component Descriptions

#### Duroc

*MLRA:* 72—Central High Tableland

*Landform:* Stream terrace on river valley

*Parent material:* Alluvium

*Slope:* 0 to 1 percent

*Drainage class:* Well drained

*Slowest permeability:* Moderate (about 0.60 in/hr)

*Available water capacity:* High (about 11.4 inches)

*Shrink-swell potential:* Low (about 1.5 LEP)

*Flooding hazard:* None

*Depth to seasonal zone of saturation:* Greater than 6 feet

*Runoff class:* Negligible

*Ecological site:* Silty; Veg. Zone 2

*Land capability (irrigated):* 1-6

*Land capability (nonirrigated):* 2c

*Typical profile:*

Ap—0 to 12 inches; loam

A—12 to 24 inches; loam

Bw—24 to 31 inches; loam

BC—31 to 37 inches; loam

C1—37 to 46 inches; loam

C2—46 to 60 inches; loam

### Minor components

Alice and similar soils

*Extent within map unit:* About 5 percent

*Slope:* 0 to 1 percent

*Drainage class:* Well drained

*Ecological site:* Sandy; Veg. Zone 2

Chappell and similar soils

*Extent within map unit:* About 5 percent

*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

### **Major Uses**

Most areas of this map unit are used for irrigated production of corn and alfalfa.

## **2639—Duroc loam, terrace, 1 to 3 percent slopes**

### **Map Unit Composition**

Duroc and similar soils: 90 percent  
 Minor components: 10 percent

### **Component Descriptions**

#### **Duroc**

*MLRA:* 72—Central High Tableland  
*Landform:* Stream terrace on river valley  
*Parent material:* Alluvium  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* High (about 11.4 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 2e-6  
*Land capability (nonirrigated):* 2e

#### **Typical profile:**

Ap—0 to 12 inches; loam  
 A—12 to 24 inches; loam  
 Bw—24 to 31 inches; loam  
 BC—31 to 37 inches; loam  
 C1—37 to 46 inches; loam  
 C2—46 to 60 inches; loam

#### **Minor components**

Alice and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

Chappell and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained

*Ecological site:* Sandy; Veg. Zone 2

### **Major Uses**

Most areas of this map unit are used for irrigated production of corn and alfalfa.

## **3050—Glenberg fine sandy loam, 0 to 1 percent slopes, rarely flooded**

### **Map Unit Composition**

Glenberg and similar soils: 90 percent  
 Minor components: 10 percent

### **Component Descriptions**

#### **Glenberg**

*MLRA:* 72—Central High Tableland  
*Landform:* Flood plain on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately rapid (about 2.00 in/hr)  
*Available water capacity:* Moderate (about 7.5 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* Rare  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Very low  
*Ecological site:* Sandy Lowland; Veg. Zone 1  
*Land capability (irrigated):* 2e-8  
*Land capability (nonirrigated):* 3e  
*Typical profile:*  
 A—0 to 8 inches; fine sandy loam  
 C—8 to 60 inches; stratified loamy fine sand to fine sandy loam to very fine sandy loam

#### **Minor components**

Chappell and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

Broadwater  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat excessively drained  
*Ecological site:* Shallow to Gravel; Veg. Zone 2

### **Major Uses**

Most areas of this map unit are used as rangeland.

### 3140—Gothenburg soils, 0 to 1 percent slopes, occasionally flooded

#### **Map Unit Composition**

Gothenburg and similar soils: 85 percent  
Minor components: 15 percent

#### **Component Descriptions**

##### **Gothenburg soils**

*MLRA:* 72—Central High Tableland  
*Landform:* Flood plain on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 1 percent  
*Drainage class:* Poorly drained  
*Slowest permeability:* Rapid (about 6.00 in/hr)  
*Available water capacity:* Very low (about 2.5 inches)  
*Shrink-swell potential:* Low (about 0.5 LEP)  
*Flooding hazard:* Occasional  
*Depth to seasonal zone of saturation:* About 0 to 18 inches  
*Runoff class:* Very low  
*Land capability (nonirrigated):* 7s  
*Typical profile:*  
A—0 to 5 inches; loamy sand  
C—5 to 14 inches; sand  
Cg—14 to 60 inches; coarse sand

##### **Minor components**

Platte and similar soils  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Subirrigated; Veg. Zone 2

#### **Major Uses**

Most areas of this map unit are used as rangeland.

### 3952—Jankosh loam, 0 to 1 percent slopes, rarely flooded

#### **Map Unit Composition**

Jankosh and similar soils: 85 percent  
Minor components: 15 percent

#### **Component Descriptions**

##### **Jankosh**

*MLRA:* 72—Central High Tableland  
*Landform:* Flood plain on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained

*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* Moderate (about 6.7 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* Rare  
*Depth to seasonal zone of saturation:* About 18 to 36 inches  
*Runoff class:* Low  
*Ecological site:* Saline Subirrigated; Veg. Zone 2  
*Land capability (irrigated):* 4s-6  
*Land capability (nonirrigated):* 6s  
*Typical profile:*  
A—0 to 2 inches; loam  
E—2 to 4 inches; loam  
Btn—4 to 14 inches; sandy clay loam  
Bkn1—14 to 18 inches; loam  
Bkn2—18 to 33 inches; very fine sandy loam  
2C—33 to 60 inches; gravelly coarse sand

##### **Minor components**

Platte and similar soils  
*Extent within map unit:* About 10 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Subirrigated; Veg. Zone 2  
Lexsworth and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Silty Lowland; Veg. Zone 2

#### **Special Features**

This map unit is on a high flood plain. The river channel has become entrenched. Dams that have been built upstream reduce the hazard of flooding.

#### **Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

### 4028—Jayem fine sandy loam, 0 to 2 percent slopes

#### **Map Unit Composition**

Jayem and similar soils: 90 percent  
Minor components: 10 percent

#### **Component Descriptions**

##### **Jayem**

*MLRA:* 72—Central High Tableland

*Landform:* Plain on tableland  
*Parent material:* Sandy and silty eolian deposits  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately rapid (about 2.00 in/hr)  
*Available water capacity:* Moderate (about 8.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Very low  
*Ecological site:* Sandy; Veg. Zone 2  
*Land capability (irrigated):* 2e-8  
*Land capability (nonirrigated):* 3e  
*Typical profile:*  
     Ap—0 to 6 inches; fine sandy loam  
     A—6 to 9 inches; fine sandy loam  
     Bw—9 to 22 inches; fine sandy loam  
     C1—22 to 50 inches; fine sandy loam  
     C2—50 to 60 inches; fine sandy loam

#### Minor components

Sarben and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

Satanta and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

#### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

### 4070—Johnstown-Satanta-Richfield loams, 0 to 1 percent slopes

#### Map Unit Composition

Johnstown and similar soils: 35 percent  
 Satanta and similar soils: 31 percent  
 Richfield and similar soils: 29 percent  
 Minor components: 5 percent

#### Component Descriptions

##### Johnstown

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland

*Parent material:* Loess  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* High (about 9.0 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Negligible  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 1-4  
*Land capability (nonirrigated):* 2c  
*Typical profile:*  
     Ap—0 to 9 inches; loam  
     Bt1—9 to 25 inches; silty clay loam  
     Bt2—25 to 29 inches; silty clay loam  
     BCk—29 to 35 inches; loam  
     C1—35 to 46 inches; very fine sandy loam  
     2C2—46 to 60 inches; coarse sand

##### Satanta

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* High (about 9.8 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Negligible  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 1-4  
*Land capability (nonirrigated):* 2c

#### Typical profile:

    Ap—0 to 8 inches; loam  
     Bt—8 to 25 inches; clay loam  
     BCk—25 to 32 inches; loam  
     C1—32 to 52 inches; very fine sandy loam  
     2C2—52 to 60 inches; sand

##### Richfield

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Very slow (about 0.01 in/hr)

*Available water capacity:* High (about 10.1 inches)  
*Shrink-swell potential:* High (about 7.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Negligible  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 1-4  
*Land capability (nonirrigated):* 2c

*Typical profile:*  
 Ap—0 to 7 inches; loam  
 Bt1—7 to 12 inches; silty clay  
 Bt2—12 to 17 inches; silty clay loam  
 BC—17 to 21 inches; silt loam  
 BCk—21 to 32 inches; silt loam  
 C1—32 to 42 inches; silt loam  
 2C2—42 to 48 inches; fine sandy loam  
 2C3—48 to 78 inches; sandy loam  
 2C4—78 to 80 inches; gravelly coarse sand

#### Minor components

Alltvan and similar soils  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

#### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

### 4151—Keith loam, 1 to 3 percent slopes

#### Map Unit Composition

Keith and similar soils: 90 percent  
 Minor components: 10 percent

#### Component Descriptions

##### Keith

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* High (about 11.3 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low

*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 2e-4  
*Land capability (nonirrigated):* 2e

*Typical profile:*  
 Ap—0 to 6 inches; loam  
 A—6 to 13 inches; loam  
 Bt1—13 to 22 inches; silty clay loam  
 Bt2—22 to 31 inches; silt loam  
 BCk—31 to 48 inches; silt loam  
 C—48 to 60 inches; very fine sandy loam

#### Minor components

Alliance and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 1 to 3 percent  
*Depth to restrictive feature:* 40 to 60 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

Duroc and similar soils  
*Extent within map unit:* About 3 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty Lowland; Veg. Zone 2

Lodgepole and similar soils  
*Extent within map unit:* About 2 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Clayey Overflow; Veg. Zone 2

#### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

### 4152—Keith loam, 3 to 6 percent slopes

#### Map Unit Composition

Keith and similar soils: 90 percent  
 Minor components: 10 percent

#### Component Descriptions

##### Keith

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 3 to 6 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* High (about 10.6 inches)

*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 3e-4  
*Land capability (nonirrigated):* 3e

*Typical profile:*

Ap—0 to 7 inches; loam  
 Bt1—7 to 14 inches; silty clay loam  
 Bt2—14 to 19 inches; silt loam  
 BCk—19 to 25 inches; loam  
 C—25 to 60 inches; loam

**Minor components**

Alliance and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 3 to 6 percent  
*Depth to restrictive feature:* 40 to 60 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

Sidney and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 3 to 6 percent  
*Depth to restrictive feature:* 40 to 60 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

**4310—Kuma loam, 0 to 1 percent slopes**

**Map Unit Composition**

Kuma and similar soils: 95 percent  
 Minor components: 5 percent

**Component Descriptions**

**Kuma**

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* High (about 10.8 inches)

*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Negligible  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 1-4  
*Land capability (nonirrigated):* 2c

*Typical profile:*

A—0 to 7 inches; loam  
 BA—7 to 17 inches; loam  
 Bt—17 to 24 inches; loam  
 Btb—24 to 37 inches; loam  
 Btkb—37 to 44 inches; loam  
 Bk—44 to 60 inches; loam

**Minor components**

Lodgepole and similar soils  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Clayey Overflow; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

**4311—Kuma loam, 1 to 3 percent slopes**

**Map Unit Composition**

Kuma and similar soils: 90 percent  
 Minor components: 10 percent

**Component Descriptions**

**Kuma**

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* High (about 11.2 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 2e-4  
*Land capability (nonirrigated):* 2e

*Typical profile:*

Ap—0 to 6 inches; loam  
 Bt1—6 to 10 inches; silty clay loam  
 Bt2—10 to 23 inches; silty clay loam  
 Btb1—23 to 33 inches; silty clay loam  
 Btb2—33 to 41 inches; silt loam  
 C—41 to 60 inches; loam

**Minor components**

## Satanta and similar soils

*Extent within map unit:* About 8 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

## Lodgepole and similar soils

*Extent within map unit:* About 2 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Clayey Overflow; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

**4472—Las Animas loam, 0 to 1 percent slopes, channeled, frequently flooded****Map Unit Composition**

Las Animas and similar soils: 95 percent  
 Minor components: 5 percent

**Component Descriptions****Las Animas**

*MLRA:* 72—Central High Tableland  
*Landform:* Flood plain on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 1 percent  
*Drainage class:* Poorly drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* Moderate (about 7.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* Frequent  
*Depth to seasonal zone of saturation:* About 0 to 18 inches  
*Runoff class:* Negligible  
*Ecological site:* Silty Overflow; Veg. Zone 2  
*Land capability (nonirrigated):* 5w  
*Typical profile:*  
 A—0 to 5 inches; loam

ACg—5 to 11 inches; fine sandy loam  
 Cg1—11 to 33 inches; stratified sandy loam to fine sandy loam  
 Cg2—33 to 60 inches; stratified loamy fine sand to very fine sandy loam

**Minor components**

## Ralton and similar soils

*Slope:* 0 to 1 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Silty Lowland; Veg. Zone 2

**Special Features**

This map unit is on a first-level flood plain. The river channel has become entrenched and dissected with meandering channels. Some small areas have short, steep slopes.

**Major Uses**

Most areas of this map unit are used as rangeland.

**4475—Las Animas loam, 0 to 1 percent slopes, occasionally flooded****Map Unit Composition**

Las Animas and similar soils: 92 percent  
 Minor components: 8 percent

**Component Descriptions****Las Animas**

*MLRA:* 72—Central High Tableland  
*Landform:* Flood plain on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 2 percent  
*Drainage class:* Somewhat poorly drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* Moderate (about 7.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* Occasional  
*Depth to seasonal zone of saturation:* About 18 to 36 inches  
*Runoff class:* Negligible  
*Ecological site:* Subirrigated; Veg. Zone 2  
*Land capability (irrigated):* 2w-8  
*Land capability (nonirrigated):* 2w

*Typical profile:*

A—0 to 5 inches; loam  
 ACg—5 to 11 inches; fine sandy loam  
 Cg1—11 to 33 inches; stratified sandy loam to fine sandy loam

Cg2—33 to 60 inches; stratified loamy fine sand to very fine sandy loam

### Minor components

Ralton and similar soils

*Extent within map unit:* About 6 percent

*Slope:* 0 to 2 percent

*Drainage class:* Moderately well drained

*Ecological site:* Silty Lowland; Veg. Zone 2

Glenberg and similar soils

*Extent within map unit:* About 2 percent

*Slope:* 0 to 2 percent

*Drainage class:* Well drained

*Ecological site:* Sandy Lowland; Veg. Zone 1

### Major Uses

Most areas of this map unit are used for irrigated production of corn and alfalfa.

## 4592—Lexsworth loam, 0 to 1 percent slopes, very rarely flooded

### Map Unit Composition

Lexsworth and similar soils: 85 percent

Minor components: 15 percent

### Component Descriptions

#### Lexsworth

*MLRA:* 72—Central High Tableland

*Landform:* Flood plain on river valley

*Parent material:* Alluvium

*Slope:* 0 to 1 percent

*Drainage class:* Moderately well drained

*Slowest permeability:* Moderately slow (about 0.20 in/hr)

*Available water capacity:* Low (about 5.5 inches)

*Shrink-swell potential:* Low (about 1.5 LEP)

*Flooding hazard:* Very rare

*Depth to seasonal zone of saturation:* About 60 to 96 inches

*Runoff class:* Negligible

*Ecological site:* Silty Lowland; Veg. Zone 2

*Land capability (irrigated):* 3w-7

*Land capability (nonirrigated):* 3w

*Typical profile:*

Ap—0 to 12 inches; loam

C1—12 to 19 inches; sandy clay loam

C2—19 to 26 inches; coarse sandy loam

C3—26 to 33 inches; coarse sand

C4—33 to 52 inches; coarse sand

C5—52 to 60 inches; fine sand

C6—60 to 80 inches; coarse sand

### Minor components

Merrick and similar soils

*Extent within map unit:* About 10 percent

*Slope:* 0 to 1 percent

*Drainage class:* Moderately well drained

*Ecological site:* Silty Lowland; Veg. Zone 2

Platte and similar soils

*Extent within map unit:* About 5 percent

*Slope:* 0 to 1 percent

*Drainage class:* Somewhat poorly drained

*Ecological site:* Subirrigated; Veg. Zone 2

### Special Features

This map unit is on a high flood plain. The river channel has become entrenched. Dams that have been built upstream reduce the hazard of flooding.

### Major Uses

Most areas of this map unit are used for irrigated production of corn and alfalfa.

## 4655—Lodgepole silt loam, ponded

### Map Unit Composition

Lodgepole and similar soils: 95 percent

Minor components: 5 percent

### Component Descriptions

#### Lodgepole

*MLRA:* 72—Central High Tableland

*Landform:* Playa on tableland

*Parent material:* Loess

*Slope:* 0 to 1 percent

*Drainage class:* Somewhat poorly drained

*Slowest permeability:* Very slow (about 0.01 in/hr)

*Available water capacity:* High (about 10.1 inches)

*Shrink-swell potential:* High (about 7.5 LEP)

*Flooding hazard:* None

*Ponding hazard:* Occasional

*Seasonal zone of saturation:* At the surface

*Runoff class:* Very low

*Ecological site:* Clayey Overflow; Veg. Zone 2

*Land capability (irrigated):* 4w-2

*Land capability (nonirrigated):* 3w

*Typical profile:*

Ap—0 to 5 inches; silt loam

Bt1—5 to 14 inches; silty clay

Bt2—14 to 26 inches; silty clay

BC—26 to 32 inches; silty clay loam

C1—32 to 48 inches; loam

C2—48 to 60 inches; loam

**Minor components**

Duroc and similar soils

*Slope:* 0 to 1 percent

*Drainage class:* Well drained

*Ecological site:* Silty Lowland; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

**5212—Merrick sandy clay loam, 0 to 1 percent slopes, very rarely flooded****Map Unit Composition**

Merrick and similar soils: 90 percent

Minor components: 10 percent

**Component Descriptions****Merrick**

*MLRA:* 72—Central High Tableland

*Landform:* Flood plain on river valley

*Parent material:* Alluvium

*Slope:* 0 to 1 percent

*Drainage class:* Moderately well drained

*Slowest permeability:* Moderately slow (about 0.20 in/hr)

*Available water capacity:* High (about 11.1 inches)

*Shrink-swell potential:* Moderate (about 4.5 LEP)

*Flooding hazard:* Very rare

*Depth to seasonal zone of saturation:* About 48 to 72 inches

*Runoff class:* Negligible

*Ecological site:* Silty Lowland; Veg. Zone 2

*Land capability (irrigated):* 1-6

*Land capability (nonirrigated):* 2c

*Typical profile:*

Ap—0 to 12 inches; sandy clay loam

A—12 to 27 inches; clay loam

AC—27 to 38 inches; clay loam

C1—38 to 42 inches; loam

C2—42 to 53 inches; loam

C3—53 to 64 inches; very fine sandy loam

C4—64 to 80 inches; very fine sandy loam

**Minor components**

Duroc and similar soils

*Extent within map unit:* About 5 percent

*Slope:* 0 to 1 percent

*Drainage class:* Well drained

*Ecological site:* Silty Lowland; Veg. Zone 2

Lexsworth and similar soils

*Extent within map unit:* About 5 percent

*Slope:* 0 to 1 percent

*Drainage class:* Moderately well drained

*Ecological site:* Silty Lowland; Veg. Zone 2

**Special Features**

This map unit is on a high flood plain. The river channel has become entrenched. Dams that have been built upstream reduce the hazard of flooding.

**Major Uses**

Most areas of this map unit are used for irrigated production of corn and alfalfa.

**6132—Platte loam, 0 to 1 percent slopes, occasionally flooded****Map Unit Composition**

Platte and similar soils: 90 percent

Minor components: 10 percent

**Component Descriptions****Platte**

*MLRA:* 72—Central High Tableland

*Landform:* Flood plain on river valley

*Parent material:* Alluvium

*Slope:* 0 to 1 percent

*Drainage class:* Somewhat poorly drained

*Slowest permeability:* Moderate (about 0.60 in/hr)

*Available water capacity:* Low (about 4.2 inches)

*Shrink-swell potential:* Low (about 1.5 LEP)

*Flooding hazard:* Occasional

*Depth to seasonal zone of saturation:* About 12 to 36 inches

*Runoff class:* Negligible

*Ecological site:* Subirrigated; Veg. Zone 2

*Land capability (irrigated):* 4w-13

*Land capability (nonirrigated):* 6w

*Typical profile:*

A—0 to 5 inches; loam

AC—5 to 11 inches; fine sandy loam

C1—11 to 18 inches; fine sandy loam

2C2—18 to 60 inches; gravelly coarse sand

**Minor components**

Gothenburg and similar soils

*Slope:* 0 to 1 percent

*Drainage class:* Poorly drained

**Major Uses**

Most areas of this map unit are used as rangeland.

**6248—Ralton loam, 0 to 1 percent slopes, very rarely flooded****Map Unit Composition**

Ralton and similar soils: 90 percent  
 Minor components: 10 percent

**Component Descriptions****Ralton**

*MLRA:* 72—Central High Tableland  
*Landform:* Stream terrace on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 1 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* High (about 10.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* Very rare  
*Depth to seasonal zone of saturation:* About 36 to 72 inches  
*Runoff class:* Negligible  
*Ecological site:* Silty Lowland; Veg. Zone 2  
*Land capability (irrigated):* 1-6  
*Land capability (nonirrigated):* 2c

*Typical profile:*

- Ap1—0 to 6 inches; loam
- Ap2—6 to 14 inches; loam
- C1—14 to 24 inches; stratified very fine sandy loam to loam
- C2—24 to 34 inches; very fine sandy loam
- C3—34 to 51 inches; loam
- C4—51 to 71 inches; very fine sandy loam
- 2C5—71 to 80 inches; gravelly loamy coarse sand

**Minor components**

Alice and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

Chappell and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for irrigated production of corn and alfalfa.

**6625—Sarben loamy fine sand, 0 to 3 percent slopes****Map Unit Composition**

Sarben and similar soils: 90 percent  
 Minor components: 10 percent

**Component Descriptions****Sarben**

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Sandy and silty eolian deposits  
*Slope:* 0 to 3 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately rapid (about 2.00 in/hr)  
*Available water capacity:* Low (about 5.6 inches)  
*Shrink-swell potential:* Low (about 0.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Negligible  
*Ecological site:* Sandy; Veg. Zone 2  
*Land capability (irrigated):* 3e-10  
*Land capability (nonirrigated):* 4e

*Typical profile:*

- Ap—0 to 7 inches; loamy fine sand
- AC—7 to 15 inches; fine sandy loam
- C1—15 to 32 inches; fine sandy loam
- C2—32 to 60 inches; fine sandy loam

**Minor components**

Jayem and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 3 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

Valent and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 0 to 3 percent  
*Drainage class:* Excessively drained  
*Ecological site:* Sands; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## 6626—Sarben loamy fine sand, 3 to 6 percent slopes

### Map Unit Composition

Sarben and similar soils: 90 percent

Minor components: 10 percent

### Component Descriptions

#### Sarben

MLRA: 72—Central High Tableland

Landform: Hillside on upland

Parent material: Sandy and silty eolian deposits

Slope: 3 to 6 percent

Drainage class: Well drained

Slowest permeability: Moderately rapid (about 2.00 in/hr)

Available water capacity: Low (about 5.6 inches)

Shrink-swell potential: Low (about 0.5 LEP)

Flooding hazard: None

Depth to seasonal zone of saturation: More than 6 feet

Runoff class: Very low

Ecological site: Sandy; Veg. Zone 2

Land capability (irrigated): 4e-10

Land capability (nonirrigated): 4e

#### Typical profile:

A—0 to 7 inches; loamy fine sand

AC—7 to 15 inches; fine sandy loam

C1—15 to 32 inches; fine sandy loam

C2—32 to 60 inches; fine sandy loam

#### Minor components

Jayem and similar soils

Extent within map unit: About 5 percent

Slope: 3 to 6 percent

Drainage class: Well drained

Ecological site: Sandy; Veg. Zone 2

Valent and similar soils

Extent within map unit: About 5 percent

Slope: 3 to 6 percent

Drainage class: Excessively drained

Ecological site: Sands; Veg. Zone 2

### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## 6722—Satanta-Altvan complex, 3 to 6 percent slopes

### Map Unit Composition

Satanta and similar soils: 65 percent

Altvan and similar soils: 25 percent

Minor components: 10 percent

### Component Descriptions

#### Satanta

MLRA: 72—Central High Tableland

Landform: Hillside on upland

Hillslope position: Backslope

Parent material: Loess

Slope: 3 to 6 percent

Drainage class: Well drained

Slowest permeability: Moderately slow (about 0.20 in/hr)

Available water capacity: High (about 9.6 inches)

Shrink-swell potential: Moderate (about 4.5 LEP)

Flooding hazard: None

Depth to seasonal zone of saturation: Greater than 6 feet

Runoff class: Low

Ecological site: Silty; Veg. Zone 2

Land capability (irrigated): 3e-4

Land capability (nonirrigated): 3e

#### Typical profile:

Ap—0 to 6 inches; very fine sandy loam

Bt1—6 to 13 inches; clay loam

Bt2—13 to 19 inches; clay loam

BCK—19 to 26 inches; very fine sandy loam

C1—26 to 52 inches; very fine sandy loam

2C2—52 to 76 inches; loamy fine sand

#### Altvan

MLRA: 72—Central High Tableland

Landform: Hillside on upland

Hillslope position: Shoulder, backslope

Parent material: Loess over alluvium

Slope: 3 to 6 percent

Drainage class: Well drained

Slowest permeability: Moderately slow (about 0.20 in/hr)

Available water capacity: Moderate (about 7.3 inches)

Shrink-swell potential: Moderate (about 4.5 LEP)

Flooding hazard: None

Depth to seasonal zone of saturation: Greater than 6 feet

Runoff class: Low

Ecological site: Silty; Veg. Zone 2

Land capability (irrigated): 4e-7

Land capability (nonirrigated): 4e

#### Typical profile:

Ap—0 to 5 inches; fine sandy loam

Bt1—5 to 10 inches; clay loam

Bt2—10 to 14 inches; clay loam

BCK—14 to 24 inches; loam

C1—24 to 38 inches; very fine sandy loam  
2C2—38 to 80 inches; coarse sand

### Minor components

Johnstown and similar soils

*Extent within map unit:* About 5 percent  
*Slope:* 3 to 6 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

Jayem and similar soils

*Extent within map unit:* About 5 percent  
*Slope:* 3 to 6 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## 6725—Satanta-Ascalon complex, 0 to 2 percent slopes

### Map Unit Composition

Satanta and similar soils: 45 percent  
Ascalon and similar soils: 45 percent  
Minor components: 10 percent

### Component Descriptions

#### Satanta

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* High (about 10.3 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* More than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 2e-5  
*Land capability (nonirrigated):* 3e

#### Typical profile:

Ap—0 to 9 inches; loam  
A—9 to 14 inches; loam  
Bt—14 to 26 inches; clay loam  
BCk—26 to 31 inches; loam  
C1—31 to 55 inches; very fine sandy loam  
2C2—55 to 80 inches; sand

#### Ascalon

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* Moderate (about 7.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Sandy; Veg. Zone 2  
*Land capability (irrigated):* 2e-5  
*Land capability (nonirrigated):* 3e

#### Typical profile:

Ap—0 to 6 inches; fine sandy loam  
Bt—6 to 19 inches; sandy clay loam  
BC—19 to 35 inches; fine sandy loam  
C1—35 to 40 inches; fine sandy loam  
C2—40 to 46 inches; loamy fine sand  
C3—46 to 80 inches; stratified coarse sand to sand to loamy fine sand

### Minor components

Jayem and similar soils

*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## 6727—Satanta-Johnstown-Altvan loams, 1 to 3 percent slopes

### Map Unit Composition

Satanta and similar soils: 60 percent  
Johnstown and similar soils: 18 percent  
Altvan and similar soils: 15 percent  
Minor components: 7 percent

### Component Descriptions

#### Satanta

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 1 to 3 percent

*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* High (about 10.3 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 2e-4  
*Land capability (nonirrigated):* 2e  
*Typical profile:*  
 Ap—0 to 9 inches; loam  
 A—9 to 14 inches; loam  
 Bt—14 to 26 inches; clay loam  
 BCk—26 to 31 inches; loam  
 C1—31 to 55 inches; very fine sandy loam  
 2C2—55 to 80 inches; sand

### **Johnstown**

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* High (about 10.5 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 2e-4  
*Land capability (nonirrigated):* 2e  
*Typical profile:*  
 Ap—0 to 6 inches; loam  
 Bt—6 to 23 inches; clay loam  
 Btb—23 to 36 inches; clay loam  
 BCkb—36 to 42 inches; very fine sandy loam  
 Cb—42 to 58 inches; very fine sandy loam  
 2C—58 to 80 inches; sand

### **Altvan**

*MLRA:* 72—Central High Tableland  
*Landform:* Plain on tableland  
*Parent material:* Loess over alluvium  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained

*Slowest permeability:* Moderately slow (about 0.20 in/hr)  
*Available water capacity:* Moderate (about 6.4 inches)  
*Shrink-swell potential:* Moderate (about 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 2s-7  
*Land capability (nonirrigated):* 3e  
*Typical profile:*  
 Ap—0 to 5 inches; loam  
 Bt1—5 to 10 inches; clay loam  
 Bt2—10 to 17 inches; clay loam  
 BCk—17 to 24 inches; loam  
 C1—24 to 30 inches; loam  
 2C2—30 to 80 inches; coarse sand

### **Minor components**

Kuma and similar soils  
*Extent within map unit:* About 5 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

Lodgepole and similar soils  
*Extent within map unit:* About 2 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Clayey Overflow; Veg. Zone 2

### **Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## **6817—Scoville loamy fine sand, 0 to 3 percent slopes**

### **Map Unit Composition**

Scoville and similar soils: 95 percent  
 Minor components: 5 percent

### **Component Descriptions**

#### **Scoville**

*MLRA:* 72—Central High Tableland  
*Landform:* Stream terrace on river valley  
*Parent material:* Alluvium  
*Slope:* 0 to 3 percent

*Drainage class:* Somewhat excessively drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* Low (about 4.9 inches)  
*Shrink-swell potential:* Low (about 0.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Negligible  
*Ecological site:* Sandy; Veg. Zone 2  
*Land capability (irrigated):* 4e-11  
*Land capability (nonirrigated):* 4e

*Typical profile:*

Ap—0 to 6 inches; loamy fine sand  
 AC—6 to 10 inches; loamy fine sand  
 C1—10 to 42 inches; fine sand  
 2C2—42 to 46 inches; very fine sandy loam  
 2C3—46 to 60 inches; loamy fine sand

**Minor components**

Chappell and similar soils  
*Slope:* 0 to 3 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for irrigated production of corn and alfalfa.

**6930—Sidney loam, 3 to 6 percent slopes**

**Map Unit Composition**

Sidney and similar soils: 85 percent  
 Minor components: 15 percent

**Component Descriptions**

**Sidney**

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Shoulder, footslope  
*Parent material:* Sandstone residuum  
*Slope:* 3 to 6 percent  
*Depth to restrictive feature:* 40 to 60 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* Moderate (about 8.7 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Low  
*Ecological site:* Silty; Veg. Zone 2

*Land capability (irrigated):* 3e-6  
*Land capability (nonirrigated):* 3e

*Typical profile:*

A—0 to 11 inches; loam  
 Bw—11 to 17 inches; loam  
 Bk—17 to 29 inches; very fine sandy loam  
 C—29 to 48 inches; very fine sandy loam  
 Cr—48 to 60 inches; weathered bedrock

**Minor components**

Canyon and similar soils

*Extent within map unit:* About 10 percent  
*Slope:* 3 to 6 percent  
*Depth to restrictive feature:* 6 to 20 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Shallow Limy; Veg. Zone 2

Alliance and similar soils

*Extent within map unit:* About 5 percent  
*Slope:* 3 to 6 percent  
*Depth to restrictive feature:* 40 to 60 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

**6937—Sidney-Canyon loams, 3 to 9 percent slopes**

**Map Unit Composition**

Sidney and similar soils: 65 percent  
 Canyon and similar soils: 25 percent  
 Minor components: 10 percent

**Component Descriptions**

**Sidney**

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Footslope, shoulder  
*Parent material:* Sandstone residuum  
*Slope:* 6 to 9 percent  
*Depth to restrictive feature:* 40 to 60 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* Moderate (about 8.7 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None

*Depth to seasonal zone of saturation:* More than 6 feet

*Runoff class:* Medium

*Ecological site:* Silty; Veg. Zone 2

*Land capability (irrigated):* 4e-6

*Land capability (nonirrigated):* 4e

*Typical profile:*

A—0 to 11 inches; loam

Bw—11 to 17 inches; loam

Bk—17 to 29 inches; very fine sandy loam

C—29 to 48 inches; very fine sandy loam

Cr—48 to 60 inches; weathered bedrock

### **Canyon**

*MLRA:* 72—Central High Tableland

*Landform:* Hillside on upland

*Hillslope position:* Backslope, shoulder

*Parent material:* Sandstone residuum

*Slope:* 6 to 9 percent

*Depth to restrictive feature:* 6 to 20 inches to bedrock (paralithic)

*Drainage class:* Well drained

*Slowest permeability:* Moderate (about 0.60 in/hr)

*Available water capacity:* Very low (about 1.9 inches)

*Shrink-swell potential:* Low (about 1.5 LEP)

*Flooding hazard:* None

*Depth to seasonal zone of saturation:* More than 6 feet

*Runoff class:* Medium

*Ecological site:* Shallow Limy; Veg. Zone 2

*Land capability (nonirrigated):* 6s

*Typical profile:*

A—0 to 5 inches; loam

C—5 to 10 inches; very fine sandy loam

Cr—10 to 60 inches; weathered bedrock

### **Minor components**

Rosebud and similar soils

*Slope:* 6 to 9 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)

*Drainage class:* Well drained

*Ecological site:* Silty; Veg. Zone 2

### **Major Uses**

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## **7120—Sulco-McConaughy loams, 3 to 6 percent slopes, moderately eroded**

### **Map Unit Composition**

Sulco and similar soils: 55 percent

McConaughy and similar soils: 30 percent

Minor components: 15 percent

### **Component Descriptions**

#### **Sulco**

*MLRA:* 72—Central High Tableland

*Landform:* Hillside on upland

*Hillslope position:* Shoulder, backslope

*Parent material:* Loess

*Slope:* 3 to 6 percent

*Drainage class:* Well drained

*Slowest permeability:* Moderate (about 0.60 in/hr)

*Available water capacity:* High (about 10.8 inches)

*Shrink-swell potential:* Low (about 1.5 LEP)

*Flooding hazard:* None

*Depth to seasonal zone of saturation:* Greater than 6 feet

*Runoff class:* Low

*Ecological site:* Limy Upland; Veg. Zone 2

*Land capability (irrigated):* 3e-6

*Land capability (nonirrigated):* 4e

*Typical profile:*

Ap—0 to 5 inches; loam

AC—5 to 16 inches; loam

C1—16 to 26 inches; loam

C2—26 to 60 inches; loam

#### **McConaughy**

*MLRA:* 72—Central High Tableland

*Landform:* Hillside on upland

*Hillslope position:* Shoulder, footslope

*Parent material:* Loess

*Slope:* 3 to 6 percent

*Drainage class:* Well drained

*Slowest permeability:* Moderate (about 0.60 in/hr)

*Available water capacity:* High (about 10.8 inches)

*Shrink-swell potential:* Low (about 1.5 LEP)

*Flooding hazard:* None

*Depth to seasonal zone of saturation:* Greater than 6 feet

*Runoff class:* Low

*Ecological site:* Silty; Veg. Zone 2

*Land capability (irrigated):* 3e-6

*Land capability (nonirrigated):* 4e

*Typical profile:*

A—0 to 7 inches; loam

Bw—7 to 18 inches; loam

Bk—18 to 28 inches; loam

C—28 to 60 inches; loam

### **Minor components**

Keith and similar soils

*Extent within map unit:* About 10 percent

*Geomorphic position:* Hillside on upland  
*Slope:* 3 to 6 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

#### Duroc and similar soils

*Extent within map unit:* About 5 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty Lowland; Veg. Zone 2

### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## 7121—Sulco-McConaughy loams, 6 to 9 percent slopes, moderately eroded

### Map Unit Composition

Sulco and similar soils: 65 percent  
 McConaughy and similar soils: 25 percent  
 Minor components: 10 percent

### Component Descriptions

#### Sulco

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Backslope, shoulder  
*Parent material:* Loess  
*Slope:* 6 to 9 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* High (about 10.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Limy Upland; Veg. Zone 2  
*Land capability (irrigated):* 4e-6  
*Land capability (nonirrigated):* 4e  
*Typical profile:*  
     Ap—0 to 5 inches; loam  
     AC—5 to 16 inches; loam  
     C1—16 to 26 inches; loam  
     C2—26 to 60 inches; loam

#### McConaughy

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Shoulder, footslope

*Parent material:* Loess  
*Slope:* 6 to 9 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* High (about 10.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (irrigated):* 4e-6  
*Land capability (nonirrigated):* 4e  
*Typical profile:*  
     A—0 to 7 inches; loam  
     Bw—7 to 18 inches; loam  
     Bk—18 to 28 inches; loam  
     C—28 to 60 inches; loam

### Minor components

#### Keith and similar soils

*Extent within map unit:* About 5 percent  
*Geomorphic position:* Hillside on upland; hillside on tableland  
*Slope:* 3 to 6 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

#### Sarben and similar soils

*Extent within map unit:* About 5 percent  
*Geomorphic position:* Hillside on upland  
*Slope:* 6 to 9 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

### Major Uses

Most areas of this map unit are used for dryland production of winter wheat. In some areas a rotation of millet, sunflowers, or corn is used.

## 7122—Sulco-McConaughy loams, 9 to 20 percent slopes, moderately eroded

### Map Unit Composition

Sulco and similar soils: 70 percent  
 McConaughy and similar soils: 20 percent  
 Minor components: 10 percent

### Component Descriptions

#### Sulco

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland

*Hillslope position:* Backslope, shoulder  
*Parent material:* Loess  
*Slope:* 9 to 20 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* High (about 10.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Limy Upland; Veg. Zone 2  
*Land capability (nonirrigated):* 6e

*Typical profile:*  
 Ap—0 to 5 inches; loam  
 AC—5 to 16 inches; loam  
 C1—16 to 26 inches; loam  
 C2—26 to 60 inches; loam

### **McConaughy**

*MLRA:* 72—Central High Tableland  
*Landform:* Hillside on upland  
*Hillslope position:* Shoulder, footslope  
*Parent material:* Loess  
*Slope:* 9 to 15 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (about 0.60 in/hr)  
*Available water capacity:* High (about 10.8 inches)  
*Shrink-swell potential:* Low (about 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Silty; Veg. Zone 2  
*Land capability (nonirrigated):* 6e

*Typical profile:*  
 A—0 to 7 inches; loam  
 Bw—7 to 18 inches; loam  
 Bk—18 to 28 inches; loam  
 C—28 to 60 inches; loam

### **Minor components**

Keith and similar soils  
*Extent within map unit:* About 5 percent  
*Geomorphic position:* Hillside on upland  
*Slope:* 3 to 6 percent  
*Drainage class:* Well drained  
*Ecological site:* Silty; Veg. Zone 2

Sarben and similar soils  
*Extent within map unit:* About 5 percent  
*Geomorphic position:* Hillside on upland

*Slope:* 9 to 15 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

### **Major Uses**

Most areas of this map unit are used as rangeland.

## **7582—Valent fine sand, 3 to 9 percent slopes**

### **Map Unit Composition**

Valent and similar soils: 90 percent  
 Minor components: 10 percent

### **Component Descriptions**

#### **Valent**

*MLRA:* 72—Central High Tableland  
*Landform:* Dune on sandhills  
*Parent material:* Eolian sands  
*Slope:* 3 to 9 percent  
*Drainage class:* Excessively drained  
*Slowest permeability:* Rapid (about 6.00 in/hr)  
*Available water capacity:* Low (about 3.6 inches)  
*Shrink-swell potential:* Low (0.0 LEP)  
*Flooding hazard:* None  
*Depth to seasonal zone of saturation:* Greater than 6 feet  
*Runoff class:* Very low  
*Ecological site:* Sands; Veg. Zone 2  
*Land capability (irrigated):* 4e-12  
*Land capability (nonirrigated):* 6e

*Typical profile:*  
 A—0 to 4 inches; fine sand  
 C—4 to 60 inches; fine sand

#### **Minor components**

Sarben and similar soils  
*Slope:* 3 to 9 percent  
*Drainage class:* Well drained  
*Ecological site:* Sandy; Veg. Zone 2

### **Major Uses**

Most areas of this map unit are used as rangeland.

## **7586—Valent fine sand, rolling**

### **Map Unit Composition**

Valent and similar soils: 95 percent  
 Minor components: 5 percent

**Component Descriptions****Valent**

MLRA: 72—Central High Tableland  
 Landform: Dune on sandhills  
 Parent material: Eolian sands  
 Slope: 9 to 24 percent  
 Drainage class: Excessively drained  
 Slowest permeability: Rapid (about 6.00 in/hr)  
 Available water capacity: Low (about 3.6 inches)  
 Shrink-swell potential: Low (0.0 LEP)  
 Flooding hazard: None  
 Depth to seasonal zone of saturation: More than 6 feet  
 Runoff class: Low  
 Ecological site: Sands; Veg. Zone 2  
 Land capability (nonirrigated): 6e

*Typical profile:*

A—0 to 4 inches; fine sand  
 C—4 to 60 inches; fine sand

**Minor components**

Sarben and similar soils  
 Slope: 3 to 9 percent  
 Drainage class: Well drained  
 Ecological site: Sandy; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used as rangeland.

**7588—Valent complex, rolling and hilly****Map Unit Composition**

Valent, rolling, and similar soils: 50 percent  
 Valent, hilly, and similar soils: 45 percent  
 Minor components: 5 percent

**Component Descriptions****Valent, rolling**

MLRA: 72—Central High Tableland  
 Landform: Dune on sandhills  
 Parent material: Eolian sands  
 Slope: 9 to 24 percent  
 Drainage class: Excessively drained  
 Slowest permeability: Rapid (about 6.00 in/hr)  
 Available water capacity: Low (about 3.6 inches)  
 Shrink-swell potential: Low (0.0 LEP)  
 Flooding hazard: None  
 Depth to seasonal zone of saturation: More than 6 feet  
 Runoff class: Low  
 Ecological site: Sands; Veg. Zone 2  
 Land capability (nonirrigated): 6e

*Typical profile:*

A—0 to 4 inches; fine sand

C—4 to 60 inches; fine sand

**Valent, hilly**

MLRA: 72—Central High Tableland  
 Landform: Dune on sandhills  
 Parent material: Eolian sands  
 Slope: 24 to 60 percent  
 Drainage class: Excessively drained  
 Slowest permeability: Rapid (about 6.00 in/hr)  
 Available water capacity: Low (about 3.6 inches)  
 Shrink-swell potential: Low (0.0 LEP)  
 Flooding hazard: None  
 Depth to seasonal zone of saturation: More than 6 feet  
 Runoff class: Low  
 Ecological site: Choppy Sands; Veg. Zone 2  
 Land capability (nonirrigated): 7e

*Typical profile:*

A—0 to 4 inches; fine sand  
 C—4 to 60 inches; fine sand

**Minor components**

Sarben and similar soils  
 Slope: 3 to 9 percent  
 Drainage class: Well drained  
 Ecological site: Sandy; Veg. Zone 2

**Major Uses**

Most areas of this map unit are used as rangeland.

**9975—Sanitary landfill****Component Description**

This map unit consists of accumulated waste products of human habitation that can be above or below the natural ground level. The unit has been used as the county landfill for several years. It is poorly suited to use as cropland or as a site for engineering practices.

**9985—Pits, sand and gravel****Component Description**

This map unit consists of areas from which sand and gravel have been removed for construction purposes.

**9998—Water****Component Description**

This map unit consists of streams, lakes, ponds, and estuaries. Some areas are covered with water in most years, at least during the growing season. Many areas are covered throughout the year.

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1130	Alliance loam, 0 to 1 percent slopes-----	8,402	3.0
1146	Alliance-Rosebud loams, 1 to 3 percent slopes-----	16,496	5.8
1198	Altvan-Eckley-Satanta complex, 3 to 9 percent slopes-----	19,587	6.9
1295	Ashollow-Tassel complex, 9 to 30 percent slopes-----	3,202	1.1
1588	Blueridge-Altvan complex, 6 to 30 percent slopes-----	28,401	10.1
1782	Broadwater loamy sand, 0 to 1 percent slopes, frequently flooded-----	4,359	1.5
1944	Calamus sand, 0 to 1 percent slopes, very rarely flooded-----	675	0.2
2072	Chappell-Alice-Broadwater complex, 0 to 3 percent slopes-----	14,343	5.1
2630	Duroc loam, 0 to 1 percent slopes-----	10,723	3.8
2638	Duroc loam, terrace, 0 to 1 percent slopes-----	5,231	1.9
2639	Duroc loam, terrace, 1 to 3 percent slopes-----	798	0.3
3050	Glenberg fine sandy loam, 0 to 1 percent slopes, rarely flooded-----	2,621	0.9
3140	Gothenburg soils, 0 to 1 percent slopes, occasionally flooded-----	1,706	0.6
3952	Jankosh loam, 0 to 1 percent slopes, rarely flooded-----	1,097	0.4
4028	Jayem fine sandy loam, 0 to 2 percent slopes-----	1,348	0.5
4070	Johnstown-Satanta-Richfield loams, 0 to 1 percent slopes-----	23,283	8.3
4151	Keith loam, 1 to 3 percent slopes-----	10,179	3.6
4152	Keith loam, 3 to 6 percent slopes-----	133	*
4310	Kuma loam, 0 to 1 percent slopes-----	2,504	0.9
4311	Kuma loam, 1 to 3 percent slopes-----	326	0.1
4472	Las Animas loam, 0 to 1 percent slopes, channeled, frequently flooded----	1,358	0.5
4475	Las Animas loam, 0 to 1 percent slopes, occasionally flooded-----	467	0.2
4592	Lexsworth loam, 0 to 1 percent slopes, very rarely flooded-----	1,695	0.6
4655	Lodgepole silt loam, ponded-----	1,416	0.5
5212	Merrick sandy clay loam, 0 to 1 percent slopes, very rarely flooded-----	997	0.4
6132	Platte loam, 0 to 1 percent slopes, occasionally flooded-----	936	0.3
6248	Ralton loam, 0 to 1 percent slopes, very rarely flooded-----	3,537	1.3
6625	Sarben loamy fine sand, 0 to 3 percent slopes-----	675	0.2
6626	Sarben loamy fine sand, 3 to 6 percent slopes-----	4,483	1.6
6722	Satanta-Altvan complex, 3 to 6 percent slopes-----	15,271	5.4
6725	Satanta-Ascalon complex, 0 to 2 percent slopes-----	1,735	0.6
6727	Satanta-Johnstown-Altvan loams, 1 to 3 percent slopes-----	61,994	22.0
6817	Scoville loamy fine sand, 0 to 3 percent slopes-----	705	0.2
6930	Sidney loam, 3 to 6 percent slopes-----	8,733	3.1
6937	Sidney-Canyon loams, 3 to 9 percent slopes-----	7,147	2.5
7120	Sulco-McConaughy loams, 3 to 6 percent slopes, moderately eroded-----	8,055	2.9
7121	Sulco-McConaughy loams, 6 to 9 percent slopes, moderately eroded-----	1,934	0.7
7122	Sulco-McConaughy loams, 9 to 20 percent slopes, moderately eroded-----	433	0.2
7582	Valent fine sand, 3 to 9 percent slopes-----	2,020	0.7
7586	Valent fine sand, rolling-----	1,882	0.7
7588	Valent complex, rolling and hilly-----	339	0.1
9975	Sanitary landfill-----	37	*
9985	Pits, sand and gravel-----	386	0.1
9998	Water-----	444	0.2
	Total-----	282,093	100.0

\* Less than 0.1 percent.

# Classification of the Soils

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The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 5 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

**ORDER.** Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

**SUBORDER.** Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustolls (*Ust*, meaning subhumid, plus *oll*, from Mollisol).

**GREAT GROUP.** Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustolls (*Hapl*, meaning minimal horizonation, plus *ustolls*, the suborder of the Mollisols that has an ustic moisture regime).

**SUBGROUP.** Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Pachic Haplustolls.

**FAMILY.** Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, superactive, mesic Pachic Haplustolls.

**SERIES.** The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1999). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

### Alice Series

The Alice series consists of very deep, well drained, moderately rapidly permeable soils on upland hillslopes and river valley terraces. These soils formed in moderately coarse textured alluvium and windblown material. Slopes range from 0 to 15 percent. Mean annual temperature is about 49 degrees F, and mean annual precipitation is about 16 inches.

### Typical Pedon

Alice fine sandy loam, in an area of irrigated cropland:

Ap—0 to 9 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable; slightly alkaline; abrupt smooth boundary.

A—9 to 13 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; soft, very friable; slightly alkaline; clear smooth boundary.

Bw—13 to 26 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure; soft, very friable; slightly alkaline; abrupt smooth boundary.

Bk—26 to 43 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure; soft, friable; violent effervescence; moderately alkaline; gradual smooth boundary.

C1—43 to 57 inches; light gray (10YR 7/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, friable; strong effervescence; moderately alkaline; gradual smooth boundary.

C2—57 to 60 inches; light gray (10YR 7/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; strong effervescence; moderately alkaline.

### Type Location

Scotts Bluff County, Nebraska; about 1 mile north and 3½ miles east of Mitchell; 2,260 feet east and 150 feet north of the southwest corner of sec. 17, T. 23 N., R. 55 W.

### Range in Characteristics

*Soil moisture:* The soil moisture control section is Aridic moisture regime bordering on Ustic.

*Mean annual soil temperature:* 46 to 54 degrees F

*Depth to secondary calcium carbonate:* 18 to 38 inches

*Depth to cambic horizon:* 7 to 20 inches

#### A horizon:

Hue—10YR

Value—4 to 6 (2 or 3 moist)

Chroma—2 or 3

Texture—loamy fine sand, fine sandy loam, or very fine sandy loam

Reaction—neutral or slightly alkaline

#### Bw horizon:

Hue—10YR

Value—6 to 8 (5 or 6 moist)

Chroma—2 to 4

Texture—fine sandy loam, loamy very fine sand, or very fine sandy loam

Content of clay—7 to 18 percent

Reaction—slightly alkaline or moderately alkaline

#### Bk horizon:

Hue—10YR

Value—6 to 8 (5 or 6 moist)

Chroma—2 to 4

Texture—fine sandy loam, loamy very fine sand, sandy loam, or very fine sandy loam

Content of clay—5 to 18 percent

Reaction—slightly alkaline or moderately alkaline

#### C horizon:

Hue—10YR

Value—6 or 7 (4 to 6 moist)

Chroma—2 to 4

Texture—dominantly fine sandy loam, but the range includes loamy fine sand, sandy loam, loamy very fine sand, and very fine sandy loam; coarser textures below a depth of 40 inches in some pedons

Content of clay—5 to 15 percent

Reaction—slightly alkaline or moderately alkaline

### Alliance Series

The Alliance series consists of deep, well drained soils that formed in a thin layer of loamy loess and the underlying calcareous, weakly cemented limestone or sandstone. Permeability is moderate or moderately slow. These soils are on uplands. Slopes range from 0 to 12 percent. Mean annual temperature is about 50 degrees F, and mean annual precipitation is about 16 inches.

### Typical Pedon

Alliance silt loam (fig. 2), on a convex, southwest-facing slope of 2 percent, in a cultivated field:

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; slightly alkaline; abrupt smooth boundary.

A—8 to 11 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to weak fine granular; slightly hard, very friable; slightly alkaline; clear smooth boundary.

Bt1—11 to 15 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to

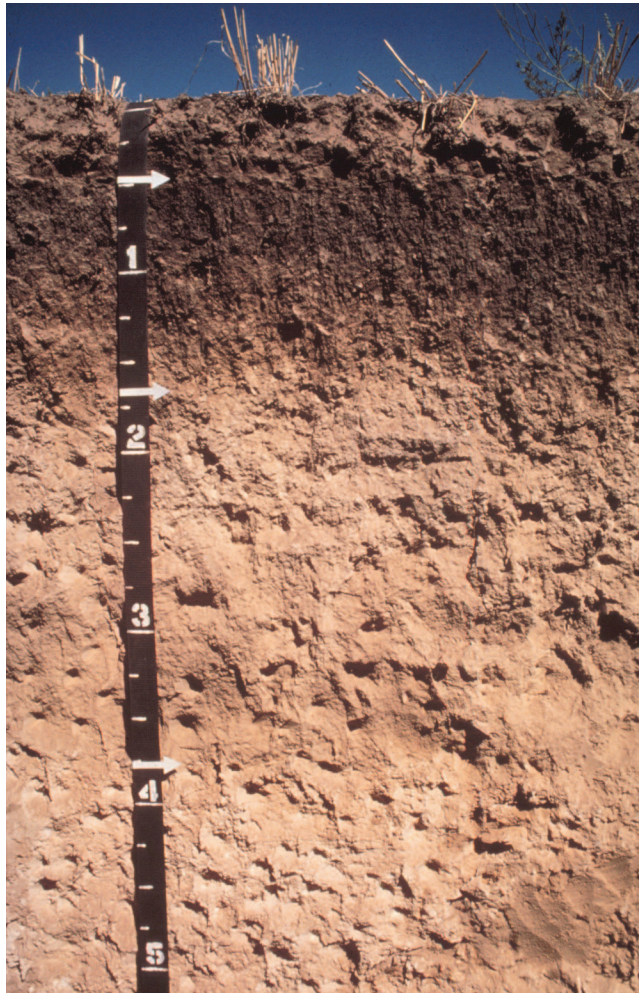


Figure 2.—A profile of an Alliance soil.

moderate medium and fine subangular blocky; slightly hard, friable; few thin patchy clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bt2—15 to 20 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable; few thin patchy clay films on faces of peds; slightly alkaline; clear smooth boundary.

BC—20 to 26 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; 2 percent sandstone gravel, by volume; slightly alkaline; clear smooth boundary.

C—26 to 51 inches; light gray (10YR 7/2) very fine sandy loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable; 5 percent sandstone

gravel, by volume; violent effervescence; moderately alkaline; clear wavy boundary.  
Cr—51 to 60 inches; light gray (10YR 7/2), weakly cemented, very fine grained sandstone, light brownish gray (10YR 6/2) moist; violent effervescence; moderately alkaline.

### Type Location

Dawes County, Nebraska; 10 miles south and 6 miles east of Crawford; 1,600 feet north and 100 feet west of the southeast corner of sec. 26, T. 30 N., R. 51 W.

### Range in Characteristics

*Thickness of the solum:* 16 to 35 inches

*Depth to free carbonates:* 16 to 35 inches

*Thickness of the mollic epipedon:* 8 to 20 inches

*Depth to the Cr horizon:* 40 to 60 inches

*Other features:* Glass shards are throughout the profile in some areas; the highest concentrations are in the C and Cr horizons. Some pedons have a Bk horizon.

#### A horizon:

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 or 2

Texture—silt loam; less commonly loam, very fine sandy loam, or fine sandy loam

Reaction—neutral or slightly alkaline

#### Bt horizon:

Hue—10YR

Value—5 or 6 (3 to 5 moist)

Chroma—2 or 3

Texture—silty clay loam; less commonly loam, silt loam, or clay loam averaging between 25 and 35 percent clay

Reaction—neutral or slightly alkaline

#### BC horizon (if it occurs):

Hue—10YR

Value—6 or 7 (4 to 6 moist)

Chroma—2 or 3

Texture—silt loam; less commonly very fine sandy loam or loam

Reaction—neutral to moderately alkaline

#### C horizon:

Hue—10YR

Value—6 to 8 (4 to 6 moist)

Chroma—2 or 3

Texture—very fine sandy loam; less commonly silt loam, loam, loamy very fine sand, or fine sandy loam

Reaction—slightly alkaline or moderately alkaline

Content of fragments—up to 10 percent, by volume, sandstone gravel

*Cr horizon:*

Hue—10YR or 7.5YR

Value—7 or 8 (6 or 7 moist)

Chroma—2 to 4

## **Altvan Series**

The Altvan series consists of well drained soils that formed in loamy sediments on upland hillslopes and valley terraces. These soils are moderately deep to sand or gravelly sand. Permeability is moderate in the solum and very rapid in the underlying material. Slopes range from 0 to 15 percent. Mean annual precipitation is about 16 inches, and mean annual temperature is 50 degrees F.

### **Typical Pedon**

Altvan loam (fig. 3) on a slope of less than 1 percent, in a cultivated field. When described, the soil was moist to a depth of 23 inches.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; many fine pebbles; neutral; abrupt smooth boundary.

A—6 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable; many fine pebbles; neutral; abrupt smooth boundary.

BA—8 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable; neutral; clear smooth boundary.

Bt—12 to 23 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, firm; thin patchy films on faces of peds; neutral in the upper part, slightly alkaline in the lower part; clear smooth boundary.

Bk—23 to 26 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable; disseminated carbonates in root channels and on faces of peds; violent effervescence; moderately alkaline; clear smooth boundary.

C1—26 to 35 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; soft, very friable; strong effervescence; strongly alkaline; gradual wavy boundary.

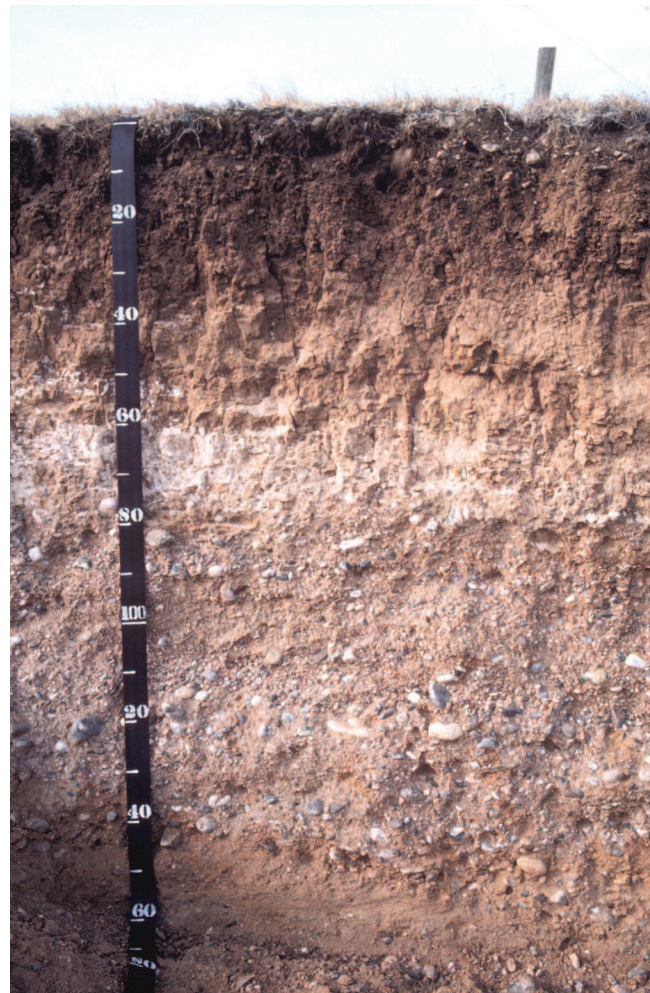


Figure 3.—A profile of an Altvan soil.

2C2—35 to 60 inches; pale brown (10YR 6/3) gravelly sand, brown (10YR 5/3) moist; single grain; 20 percent gravel, by volume; strong effervescence; strongly alkaline.

### **Type Location**

Kimball County, Nebraska; about 6 miles north and 6½ miles west of Bushnell; 2,160 feet east and 100 feet south of the northwest corner of sec. 31, T. 16 N., R. 58 W.

### **Range in Characteristics**

*Mean annual soil temperature:* 49 to 59 degrees F

*Depth to abrupt textural change:* 20 to 40 inches; typically 24 to 36 inches

*Depth to secondary calcium carbonate:* 16 to 38 inches

*Thickness of the solum:* 16 to 38 inches

*Thickness of the mollic epipedon:* 7 to 20 inches;  
includes the upper part of the argillic horizon in  
some pedons

*Content of clay in the particle-size control section  
(weighted average):* 20 to 35 percent

*Content of rock fragments:* 0 to 15 percent gravel

*A horizon:*

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—2 or 3

Texture—loam; less commonly sandy loam, fine  
sandy loam, or silt loam

Content of clay—15 to 23 percent

Reaction—slightly acid to slightly alkaline

*Bt horizon:*

Hue—10YR or 7.5YR

Value—4 to 6 (2 to 4 moist)

Chroma—2 to 4

Texture—clay loam; less commonly sandy clay  
loam or loam

Content of clay—20 to 35 percent

Reaction—neutral to moderately alkaline

*Bk horizon:*

Hue—10YR or 7.5YR

Value—5 to 7 (4 to 6 moist)

Chroma—2 or 3

Texture—silt loam; less commonly loam; some  
pedons have a very gravelly 2Bk horizon that  
extends to a depth of 60 inches or more

Content of clay—8 to 15 percent

Calcium carbonate equivalent—1 to 10 percent

Reaction—slightly alkaline to strongly alkaline

*C horizon:*

Hue—10YR or 7.5YR

Value—6 to 8 (5 or 6 moist)

Chroma—2 or 3

Texture—loam; less commonly silt loam; some  
pedons have a layer of fine sandy loam less  
than 5 inches thick above the 2C horizon

Content of clay—8 to 15 percent

Content of rock fragments—0 to 15 percent  
gravel, by volume

Reaction—slightly alkaline to strongly alkaline

*2C horizon:*

Hue—10YR or 7.5YR

Value—5 to 7 (4 to 6 moist)

Chroma—3 or 4

Texture—gravelly sand; less commonly gravelly  
coarse sand, sand, or coarse sand

Calcium carbonate equivalent—0 to 10 percent

Content of rock fragments—5 to 35 percent  
gravel, by volume

Reaction—slightly alkaline to strongly alkaline

## **Ascalon Series**

The Ascalon series consists of very deep, well  
drained soils that formed in moderately coarse  
textured calcareous material. These soils are on  
upland hillslopes and tableland plains. Slopes range  
from 0 to 25 percent. The mean annual precipitation is  
about 16 inches, and the mean annual air temperature  
is about 49 degrees F.

### **Typical Pedon**

Ascalon fine sandy loam, in an area of grassland:

A—0 to 4 inches; grayish brown (10YR 5/2) fine sandy  
loam, very dark grayish brown (10YR 3/2) moist;  
moderate very fine granular structure; soft, very  
friable; 3 percent pebbles; neutral (pH 7.0); clear  
smooth boundary.

BA—4 to 7 inches; grayish brown (10YR 5/2) fine  
sandy loam, very dark grayish brown (10YR 3/2)  
moist; weak medium subangular blocky structure  
parting to moderate medium granular; slightly  
hard, very friable; few faint clay films on faces of  
peds; 3 percent pebbles; neutral (pH 7.2); clear  
smooth boundary.

Bt1—7 to 14 inches; brown (10YR 5/3) sandy clay  
loam, dark brown (10YR 3/3) moist; moderate  
medium prismatic structure parting to moderate  
medium subangular blocky; very hard, very friable;  
many distinct clay films on faces of peds; 3  
percent pebbles; neutral (pH 7.2); gradual smooth  
boundary.

Bt2—14 to 18 inches; brown (10YR 5/3) sandy clay  
loam, brown (10YR 4/3) moist; moderate medium  
prismatic structure parting to moderate medium  
subangular blocky; very hard, very friable;  
common distinct clay films on faces of peds and in  
root channels; slightly alkaline (pH 7.4); clear  
smooth boundary.

Bk1—18 to 25 inches; light gray (2.5Y 7/2 ) loam, light  
olive brown (2.5Y 5/3) moist; weak medium  
subangular blocky structure; hard, very friable;  
concretions, thin seams, and streaks of calcium  
carbonate; few faint clay films on faces of some  
peds; 5 percent pebbles; strongly effervescent;  
moderately alkaline (pH 8.2); gradual smooth  
boundary.

Bk2—25 to 60 inches; pale yellow (2.5Y 7/3) fine

sandy loam, light olive brown (2.5Y 5/3) moist; massive; slightly hard, very friable; 5 percent pebbles; concretions, thin seams, and streaks of calcium carbonate; violently effervescent; moderately alkaline (pH 8.2).

### **Type Location**

Washington County, Colorado; on the north side of Highway 34, 5 miles east of Akron; about 2,280 feet north and 100 feet east of the southwest corner of sec. 8, T. 2 N., R. 51 W.

### **Range in Characteristics**

*Thickness of the mollic epipedon:* 7 to 20 inches

*Depth to calcareous material:* 8 to 30 inches

*Depth to argillic horizon:* 15 to 24 inches

*Content of organic carbon:* 0.6 to 2.0 percent in the mollic epipedon; decreases uniformly with increasing depth

*Content of rock fragments:* 0 to 15 percent; typically less than 5 percent

#### *A horizon:*

Hue—2.5Y or 10YR

Value—4 or 5 (2 or 3 moist)

Chroma—2 or 3

Texture—loamy sand, sandy loam, fine sandy loam, or loam

Structure—primarily granular or subangular blocky

Consistence—soft or slightly hard

Reaction—neutral or slightly alkaline (pH 6.6 to 7.6)

#### *Bt horizon:*

Hue—2.5Y to 7.5YR

Value—4 to 6 (3 or 4 moist)

Chroma—2 to 4

Texture—sandy clay loam

Content of clay—18 to 35 percent

Content of silt—5 to 30 percent

Content of sand—50 to 75 percent (more than 35 percent fine sand or coarser; only minor amounts of medium to coarse angular granitic sand)

Reaction—neutral or slightly alkaline (pH 6.8 to 7.8)

#### *Bk horizon:*

Hue—2.5Y or 10YR

Value—5 to 7

Chroma—2 to 4

Texture—fine sandy loam, sandy loam, or loam

Reaction—moderately alkaline or strongly alkaline (pH 8.0 to 8.6)

Calcium carbonate equivalent—5 to 15 percent

Content of rock fragments—variable below a depth of 40 inches

#### *C horizon (if it occurs):*

Hue—2.5Y or 10YR

Value—6 or 7 (5 or 6 moist)

Chroma—2 to 4

Texture—loamy fine sand, sandy loam, or sandy clay loam

## **Ashollow Series**

The Ashollow series consists of very deep, well drained, moderately rapidly permeable soils on upland backslopes and footslopes. These soils formed in loamy and sandy residuum derived from calcareous sandstone. Slopes range from 3 to 60 percent. The mean annual temperature is about 49 degrees F, and the mean annual precipitation is about 17 inches.

### **Typical Pedon**

Ashollow very fine sandy loam, on a convex, southwest-facing slope of 22 percent, in an area of native grass. When described, the soil was dry throughout.

A—0 to 3 inches; grayish brown (10YR 5/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, very friable; slight effervescence; moderately alkaline; clear smooth boundary.

AC—3 to 10 inches; brown (10YR 5/3) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; slightly hard, very friable; 2 percent sandstone gravel, by volume; violent effervescence; moderately alkaline; gradual smooth boundary.

C1—10 to 32 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable; 2 percent sandstone gravel, by volume; violent effervescence; moderately alkaline; gradual smooth boundary.

C2—32 to 80 inches; light yellowish brown (10YR 6/4) very fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; 3 percent sandstone gravel, by volume; violent effervescence; moderately alkaline.

### **Type Location**

Garden County, Nebraska; about 5 miles southeast of Lewellen on State Highway 26; 1,100 feet east and 100 feet south of the northwest corner of sec. 23, T. 15 N., R. 42 W.; Ruthon topographic quadrangle; lat. 41

degrees 15 minutes 53 seconds north and long. 102 degrees 6 minutes 31 seconds west.

### Range in Characteristics

*Depth to carbonates:* 0 to 10 inches

*Content of carbonates:* Tends to increase uniformly with increasing depth

*Content of sandstone gravel:* Typically less than 5 percent but ranges from 2 to 15 percent, by volume, throughout the particle-size control section

*A horizon:*

Hue—10YR

Value—4 or 5 (3 or 4 moist)

Chroma—2 or 3

Note—horizons having value of less than 5.5 dry and 3.5 moist are less than 7 inches thick.

Texture—very fine sandy loam, fine sandy loam, or loamy very fine sand

Reaction—slightly alkaline or moderately alkaline

*AC horizon (if it occurs):*

Hue—10YR

Value—4 to 6 (4 or 5 moist)

Chroma—2 to 4

Texture—very fine sandy loam, loamy very fine sand, or fine sandy loam

Reaction—slightly alkaline or moderately alkaline

*C horizon:*

Hue—10YR or 2.5Y

Value—6 to 8 (4 to 7 moist)

Chroma—2 to 4

Texture—very fine sandy loam, fine sandy loam, or loamy very fine sand

Reaction—slightly alkaline or moderately alkaline

### Blueridge Series

The Blueridge series consists of excessively drained, very rapidly permeable soils that are shallow or very shallow over bedded gravelly coarse sand. These soils formed in sandy and gravelly soil material deposited over gravelly sand on upland hillslopes. Slopes range from 6 to 60 percent. Mean annual temperature is about 50 degrees F, and mean annual precipitation is about 17 inches at the type location.

### Typical Pedon

Blueridge coarse sand, on a convex, south-facing slope of 20 percent, in an area of rangeland. When described, the soil was moist throughout.

A—0 to 4 inches; grayish brown (10YR 5/2) coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose; 9 percent gravel, by volume; moderately acid; clear wavy boundary.

C1—4 to 40 inches; light gray (10YR 7/2) gravelly coarse sand, light brownish gray (10YR 6/2) moist; single grain; loose; 18 percent gravel, by volume; moderately acid; clear wavy boundary.

C2—40 to 80 inches; light gray (10YR 7/2) gravelly coarse sand, light brownish gray (10YR 6/2) moist; single grain; loose; 23 percent gravel, by volume; slightly acid.

### Type Location

Garden County, Nebraska; about 9 miles north and 1 mile west of Lewellen; 4,050 feet west and 2,500 feet south of the northeast corner of sec. 4, T. 17 N., R. 42 W.

### Range in Characteristics

*Mean annual soil temperature:* 49 to 55 degrees F

*Depth to secondary calcium carbonate:* Typically no free carbonates; a layer of gravel coated with carbonates (typically on the underside) in some pedons

*Content of rock fragments in the particle-size control section (weighted average):* Averages 15 to 35 percent gravel, by volume, but layers can contain more than 35 percent or less than 15 percent

*Other features:* Some pedons have an AC horizon that ranges from about 3 to 10 inches thick and is intermediate between the A and C horizons in color and texture.

*A horizon:*

Hue—10YR

Value—3 to 6 (2 to 5 moist)

Chroma—1 to 3

Texture—coarse sand, loamy coarse sand, loamy sand, gravelly loamy sand, gravelly sandy loam, or gravelly loam

Content of clay—0 to 10 percent

Content of rock fragments—5 to 35 percent gravel, by volume

Reaction—moderately acid to neutral

*C horizon:*

Hue—10YR or 2.5Y

Value—5 to 8 (4 to 7 moist)

Chroma—2 to 4

Texture—dominantly gravelly coarse sand but ranges from sand to very gravelly coarse sand

Content of clay—0 to 3 percent

Content of rock fragments—averages about 15 to 35 percent, by volume  
 Reaction—moderately acid to slightly alkaline

### ***Broadwater Series***

The Broadwater series consists of very deep, excessively drained soils on valley flood plains. These soils formed in stratified sandy and gravelly alluvium. Slopes range from 0 to 2 percent. The mean annual precipitation is about 17 inches at the type location, and the mean annual air temperature is about 50 degrees F.

#### **Typical Pedon**

Broadwater loamy sand, on a slope of 1 percent, on a channeled flood plain in an area of rangeland:

- A—0 to 3 inches; light brownish gray (10YR 6/2) loamy sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable; 3 percent gravel, by volume; strong effervescence; slightly alkaline; clear smooth boundary.
- C1—3 to 9 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; single grain; soft, very friable; thin strata of loamy very fine sand; 3 percent gravel, by volume; strong effervescence; slightly alkaline; abrupt smooth boundary.
- 2C2—9 to 32 inches; pale brown (10YR 6/3) gravelly coarse sand, brown (10YR 5/3) moist; single grain; loose; thin strata of loamy very fine sand; 18 percent gravel, by volume; strong effervescence; slightly alkaline; abrupt smooth boundary.
- 2C3—32 to 60 inches; very pale brown (10YR 7/3) gravelly coarse sand, pale brown (10YR 6/3) moist; single grain; loose; thin strata of coarse sand; 31 percent gravel, by volume; strong effervescence; slightly alkaline.

#### **Type Location**

Garden County, Nebraska; about 3.5 miles south and 0.5 mile west of Oshkosh; 1,600 feet south and 900 feet west of the northeast corner of sec. 21, T. 16 N., R. 44 W.; Barn Butte topographic quadrangle; lat. 41 degrees 20 minutes 50 seconds north and long. 102 degrees 21 minutes 45 seconds west.

#### **Range in Characteristics**

*Mean annual soil temperature:* 49 to 55 degrees F  
*Depth to secondary calcium carbonate:* 0 to 80 inches  
*Texture of the particle-size control section:* Sandy

*A horizon:*

Hue—10YR

Value—5 or 6 (3 to 5 moist)  
 Chroma—2 to 4  
 Texture—loamy sand or loamy fine sand  
 Content of clay—3 to 10 percent  
 Content of rock fragments—2 to 5 percent, by volume, sandstone and granitic gravel  
 Reaction—neutral or slightly alkaline

*C horizon:*

Hue—10YR  
 Value—5 to 7 (4 to 6 moist)  
 Chroma—2 to 4  
 Texture—loamy sand or sand with strata of finer textured material  
 Content of clay—3 to 10 percent  
 Content of rock fragments—2 to 5 percent gravel, by volume  
 Calcium carbonate equivalent—0 to 10 percent  
 Reaction—neutral or slightly alkaline

*2C horizon:*

Hue—10YR  
 Value—5 to 7 (4 to 6 moist)  
 Chroma—2 to 4  
 Texture—coarse sand or gravelly coarse sand  
 Content of rock fragments—typically 15 to 35 percent gravel, but ranges from 5 to 35 percent, by volume  
 Content of clay—0 to 3 percent  
 Calcium carbonate equivalent—0 to 10 percent  
 Reaction—neutral or slightly alkaline

### ***Calamus Series***

The Calamus series consists of very deep, moderately well drained, rapidly permeable soils on river valley flood plains. These soils formed in sandy alluvium. Slopes range from 0 to 3 percent. Mean annual air temperature is about 49 degrees F, and mean annual precipitation is about 20 inches.

#### **Typical Pedon**

Calamus loamy fine sand, on a slope of less than 2 percent, in an area of rangeland:

- A—0 to 5 inches; grayish brown (10YR 5/2) loamy fine sand, very dark gray (10YR 3/1) moist; weak medium and fine granular structure; soft, very friable; slightly acid; clear smooth boundary.
- AC—5 to 14 inches; light brownish gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; weak medium granular structure; soft, very friable; slightly acid; clear smooth boundary.
- C1—14 to 21 inches; light gray (10YR 7/2) sand, light

- brownish gray (10YR 6/2) moist; single grain; loose; few thin strata of fine sandy loam and coarse sand; slightly acid; clear smooth boundary.
- C2—21 to 30 inches; light gray (10YR 7/2) sand, light brownish gray (10YR 6/2) moist; single grain; loose; few thin strata of fine sandy loam and coarse sand; about 3 percent gravel, by volume; slightly acid; clear smooth boundary.
- C3—30 to 55 inches; light gray (10YR 7/2), stratified fine sand, sand, and coarse sand, light brownish gray (10YR 6/2) moist; few medium distinct yellowish brown (10YR 5/6) iron masses in soil matrix; single grain; loose; about 10 percent gravel, by volume; slightly acid; clear smooth boundary.
- C4—55 to 60 inches; light gray (10YR 7/2) gravelly coarse sand, light brownish gray (10YR 6/2) moist; few medium distinct yellowish brown (10YR 5/6) iron masses in soil matrix; single grain; loose; about 18 percent gravel, by volume; slightly acid.

### **Type Location**

Loup County, Nebraska; about 12 miles north and 11 miles west of Taylor; 2,300 feet west and 200 feet north of the southeast corner of sec. 32, T. 23 N., R. 20 W.

### **Range in Characteristics**

*Mean annual soil temperature:* 49 to 55 degrees F  
*Depth to secondary calcium carbonate:* Typically no free carbonates  
*Depth to redox concentrations:* 20 to 40 inches  
*Depth to endosaturation:* 36 to 72 inches  
*Thickness of the solum:* 6 to 20 inches  
*Content of clay in the particle-size control section (weighted average):* 1 to 10 percent

#### *A horizon:*

Hue—10YR  
 Value—4 to 7 (2 to 5 moist)  
 Chroma—1 to 4  
 Texture—loamy fine sand, loamy sand, fine sand, sand, or coarse sand  
 Content of clay—1 to 10 percent  
 Reaction—moderately acid to slightly alkaline

#### *AC horizon:*

Hue—10YR  
 Value—5 or 6 (4 or 5 moist)  
 Chroma—1 to 3  
 Texture—fine sand, loamy fine sand, or sand  
 Content of clay—3 to 10 percent  
 Reaction—slightly acid to slightly alkaline

#### *C horizon:*

Hue—10YR

Value—6 to 8 (5 to 7 moist)

Chroma—2 to 4

Texture—sand or coarse sand with 1- to 3-inch strata of very fine sandy loam to gravelly coarse sand

Content of rock fragments—5 to 25 percent gravel, by volume

Content of clay—1 to 8 percent

Reaction—slightly acid to slightly alkaline

Other features—few to many faint to prominent redoximorphic concentrations with hue of 5YR to 10YR and chroma of 4 to 6

## **Canyon Series**

The Canyon series consists of well drained soils that are shallow over weakly cemented limestone or very fine grained sandstone. These soils formed in loamy, calcareous residuum on uplands. Permeability is moderate. Slopes range from 0 to 60 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

### **Typical Pedon**

Canyon loam (fig. 4), on a convex slope of 8 percent, in an area of rangeland:

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, very friable; slightly alkaline; abrupt smooth boundary.

AC—4 to 9 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure; slightly hard, friable; 5 percent, by volume, sandstone gravel; strong effervescence; moderately alkaline; clear smooth boundary.

C—9 to 16 inches; very pale brown (10YR 8/3) very fine sandy loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable; 10 percent, by volume, sandstone gravel; strong effervescence; moderately alkaline; abrupt wavy boundary.

Cr—16 to 80 inches; very pale brown (10YR 8/3), weakly cemented, fine grained sandstone; violent effervescence.

### **Type Location**

Box Butte County, Nebraska; 9½ miles south and 6 miles west of Hemingford; 80 feet east and 2,140 feet north of the southwest corner of sec. 32, T. 26 N., R. 50 W.

### **Range in Characteristics**

*Thickness of the solum:* 6 to 12 inches



Figure 4.—A profile of a Canyon soil.

*Depth to bedrock:* Typically about 16 inches; ranges from 6 to 20 inches

*Depth to free carbonates:* 0 to 6 inches

*Reaction:* Slightly alkaline or moderately alkaline throughout

*Content of sandstone gravel:* Typically 0 to 15 percent; ranges from 0 to 25 percent

*A horizon:*

Hue—10YR

Value—4 to 7 (3 to 6 moist)

Chroma—2 or 3

Texture—loam, silt loam, sandy loam, fine sandy loam, very fine sandy loam, gravelly loam, or gravelly sandy loam

*AC horizon (if it occurs):*

Hue—10YR

Value—5 to 8 (4 to 7 moist)

Chroma—1 to 4

Textures—same as those in the A horizon

*C horizon (if it occurs):*

Hue—10YR or 2.5Y

Value—6 to 8 (4 to 7 moist)

Chroma—2 to 4

Texture—loam, very fine sandy loam, silt loam, or gravelly loam; contains 12 to 25 percent clay

## **Chappell Series**

The Chappell series consists of well drained soils that are moderately deep over coarse sand or gravelly sand. Permeability is moderately rapid in the solum and rapid or very rapid in the underlying material. These soils formed in loamy colluvium and alluvium deposited over coarse sand or gravelly sand. They are on river valley terraces and upland hillslopes. Slopes range from 0 to 15 percent. Mean annual temperature is about 51 degrees F, and mean annual precipitation is about 15 inches.

### **Typical Pedon**

Chappell fine sandy loam, in an area of native grass:

A1—0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; neutral; abrupt smooth boundary.

A2—7 to 17 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable; neutral; clear smooth boundary.

Bw—17 to 25 inches; light brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium prismatic and subangular blocky structure; slightly hard, friable; slightly alkaline; clear smooth boundary.

C1—25 to 35 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable; strong effervescence; moderately alkaline; gradual smooth boundary.

2C2—35 to 60 inches; very pale brown (10YR 7/4) gravelly coarse sand, light yellowish brown (10YR 6/4) moist; single grain; loose; slightly alkaline; slight effervescence.

### **Type Location**

Keith County, Nebraska, about 1 mile south and 7 miles west of Big Springs; 2,700 feet west and 2,100 feet north of the southeast corner of sec. 30, T. 13 N., R. 40 W.

### Range in Characteristics

*Mean annual soil temperature:* 49 to 57 degrees F

*Depth to abrupt textural change:* 20 to 40 inches

*Depth to secondary calcium carbonate:* 15 to 30 inches; averages about 25 inches (but some pedons are noncalcareous)

*Depth to cambic horizon:* 10 to 20 inches

*Thickness of the mollic epipedon:* 10 to 20 inches; includes the A horizon and part of the upper B horizon

*Thickness of the solum:* 15 to 30 inches

*Content of clay in the particle-size control section (weighted average):* 5 to 18 percent

#### *A horizon:*

Hue—10YR or 7.5YR

Value—3 to 5 (2 or 3 moist)

Chroma—2 or 3

Texture—fine sandy loam or sandy loam; less commonly loam or loamy sand

Reaction—slightly acid or neutral

#### *Bw horizon:*

Hue—10YR or 7.5YR

Value—3 to 6 (2 to 4 moist)

Chroma—2 or 3

Texture—fine sandy loam or sandy loam

Reaction—slightly acid to moderately alkaline

#### *C horizon:*

Hue—10YR or 7.5YR

Value—5 to 8 (4 to 6 moist)

Chroma—2 to 4

Texture—fine sandy loam or sandy loam

Reaction—neutral to moderately alkaline

#### *2C horizon:*

Hue—10YR or 7.5YR

Value—5 to 8 (4 to 6 moist)

Chroma—2 to 4

Texture—gravelly coarse sand, gravelly sand, or gravelly loamy sand

Reaction—neutral to moderately alkaline

### Duroc Series

The Duroc series consists of very deep, well drained soils in swales, on toeslopes, and on stream terraces. These soils formed in loamy alluvium and eolian deposits. Slopes range from 0 to 6 percent. The average annual precipitation is about 16 inches, and the average annual air temperature is about 46 degrees F.

#### Typical Pedon

Duroc loam (fig. 5), in an area of grassland:



Figure 5.—A profile of a Duroc soil.

A—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; strong very fine granular structure; soft, very friable, slightly sticky and slightly plastic; neutral (pH 7.2); clear smooth boundary.

Bw1—6 to 20 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; slightly alkaline (pH 7.4); clear smooth boundary.

Bw2—20 to 28 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; slightly effervescent; disseminated calcium carbonate; moderately alkaline (pH 8.0); gradual smooth boundary.

Bk—28 to 80 inches; light brownish gray (10YR 6/2)

loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent; calcium carbonate occurring as soft masses and thin seams and streaks; moderately alkaline (pH 8.3).

### Type Location

Goshen County, Wyoming; 1,900 feet north and 1,950 feet east of the southwest corner of sec. 12, T. 22 N., R. 61 W.

### Range in Characteristics

*Depth to carbonates:* 15 to 36 inches

*Mean annual soil temperature:* 47 to 58 degrees F

*Thickness of the mollic epipedon:* 20 to 50 inches

*Content of organic carbon:* Decreases uniformly with increasing depth

*Texture of the particle-size control section:* Loam, silt loam; content of clay ranges from 18 to 35 percent, content of silt from 30 to 70 percent, and content of sand from 10 to 45 percent with less than 15 percent fine sand or coarser

*Content of rock fragments:* Typically none but ranges from 0 to 10 percent

*Other features:* Some pedons have an AC horizon, which has properties similar to those of the A horizon.

#### A horizon:

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 to 3

Reaction—neutral to moderately alkaline

Texture—loam, silt loam, or very fine sandy loam

#### Bw horizon:

Hue—10YR

Value—3 to 6 (2 to 4 moist)

Chroma—2 or 3

Reaction—neutral or slightly alkaline

Texture—loam, silt loam, or very fine sandy loam

#### Bk horizon (if it occurs):

Hue—10YR

Value—5 to 7 (3 to 5 moist)

Chroma—2 or 3

Reaction—moderately alkaline or strongly alkaline

Texture—loam, silt loam, or very fine sandy loam

#### C horizon (if it occurs):

Hue—10YR

Value—5 to 7 (3 to 7 moist)

Chroma—2 or 3

Reaction—slightly alkaline to strongly alkaline

Texture—loam, silt loam, or very fine sandy loam

## Eckley Series

The Eckley series consists of very deep, well drained soils that formed in Tertiary pedisements. These soils are on upland hillslopes. Slopes range from 1 to 30 percent. The mean annual precipitation is about 17 inches, and the mean annual air temperature is about 49 degrees F.

### Typical Pedon

Eckley gravelly loam, in an area of grassland:

A—0 to 4 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable; 20 percent pebbles; neutral; gradual smooth boundary.

Bt—4 to 12 inches; grayish brown (10YR 5/2) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak or moderate medium prismatic structure parting to moderate medium subangular blocky; hard, very friable; common distinct clay films on peds; 20 percent pebbles; neutral; clear smooth boundary.

BC—12 to 15 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable; few faint clay films on horizontal and vertical faces of peds and some clay bridging between sand grains; 30 percent pebbles; slightly alkaline; gradual wavy boundary.

2C—15 to 60 inches; very pale brown (10YR 7/4) very gravelly sand, yellowish brown (10YR 5/4) moist; single grain; loose; 40 percent pebbles; slightly alkaline.

### Type Location

Phillips County, Colorado; 270 feet south and 55 feet east of the N<sup>1</sup>/<sub>4</sub> corner of sec. 17, T. 7 N., R. 47 W.

### Range in Characteristics

*Mean annual soil temperature:* 49 to 52 degrees F

*Depth to contrasting gravelly or very gravelly sand:* 12 to 20 inches

*Depth to argillic horizon:* 4 to 7 inches

*Depth to secondary calcium carbonate:* Generally noncalcareous to a depth of more than 60 inches but may be calcareous below a depth of 30 inches and have some weak accumulation of secondary calcium carbonate in some pedons

*Content of organic carbon in the mollic epipedon:* 0.7 to 3 percent; decreases uniformly with increasing depth

*Base saturation in the solum:* Typically base saturated but ranges from 90 to 100 percent

*Content of clay in the particle-size control section (weighted average):* 20 to 35 percent

*Content of rock fragments:* Typically 15 to 20 percent, by volume, but ranges from 5 to 35 percent

**A horizon:**

Hue—10YR or 7.5YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 to 3

Texture—loam, gravelly loam, or gravelly sandy loam

Content of clay—10 to 25 percent

Reaction—neutral or slightly alkaline

**Bt horizon:**

Hue—10YR or 7.5YR

Value—4 to 6

Chroma—2 to 4

Texture—clay loam, gravelly sandy clay loam, or sandy clay loam

Content of clay—20 to 35 percent

Content of sand—more than 35 percent fine or coarser sand

Reaction—neutral or slightly alkaline

**BC horizon:**

Hue—10YR or 7.5YR

Value—4 to 6

Chroma—2 to 4

Texture—gravelly sandy loam

Reaction—neutral or slightly alkaline

**2C horizon:**

Hue—2.5Y to 7.5YR

Value—5 to 7 (4 or 5 moist)

Chroma—3 or 4

Texture—gravelly sand, gravelly loamy sand, or very gravelly sand

Content of rock fragments—5 to 50 percent; dominantly pebble sized

Reaction—neutral or slightly alkaline

## **Glenberg Series**

The Glenberg series consists of very deep, well drained soils that formed in stratified calcareous alluvium derived from mixed sources. These soils are on flood plains and low terraces. Slopes range from 0 to 8 percent. Mean annual precipitation is about 12 inches, and mean annual air temperature is about 52 degrees F.

### **Typical Pedon**

Glenberg sandy loam, in an area of grassland:

A—0 to 6 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable; moderately alkaline (pH 8.0); gradual smooth boundary.

C—6 to 60 inches; light brownish gray (10YR 6/2) sandy loam stratified with thin lenses of loam and loamy sand; dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable; weak and inconsistent accumulations of secondary calcium carbonate as small concretions; moderately alkaline (pH 8.2).

### **Type Location**

Crowley County, Colorado; 200 feet south and 720 feet east of the N<sup>1</sup>/<sub>4</sub> corner of sec. 17, T. 22 S., R. 58 W.

### **Range in Characteristics**

*Mean annual soil temperature:* 47 to 53 degrees F

*Mean summer soil temperature:* 65 to 74 degrees F

*Depth to bedrock or strongly contrasting substratum:* More than 40 inches

*Estimated content of organic carbon in the surface horizon:* 0.5 to 1.5 percent; decreases irregularly with increasing depth

*Texture of the control section:* Dominantly sandy loam; content of clay ranges from 5 to 18 percent, content of silt from 5 to 40 percent, and content of sand from 50 to 75 percent with more than 35 percent fine or coarser sand

*Content of rock fragments:* Ranges from 0 to 15 percent but is commonly less than 5 percent. Some pedons may have up to 30 percent rock fragments in any one horizon, but the weighted average in the particle-size control section is less than 15 percent.

*Visible secondary calcium carbonate:* Occurs as soft concretions or thin seams inconsistently at any depth

*Other features:* Typically, these soils are calcareous throughout, but they may be leached for a few inches in some pedons.

**A horizon:**

Hue—2.5Y or 10YR

Value—4 to 7 (3 to 5 moist)

Chroma—2 to 4

Texture—fine sandy loam or sandy loam

Reaction—neutral to moderately alkaline

**C horizon:**

Hue—2.5Y or 10YR

Value—5 to 7 (4 or 5 moist)

Chroma—2 to 4

Texture—variable; stratified loamy sand to clay loam  
 Reaction—slightly alkaline to strongly alkaline  
 Calcium carbonate equivalent—ranges from less than 1 percent to 3 percent but is variable from pedon to pedon and from stratum to stratum within a single pedon

### **Gothenburg Series**

The Gothenburg series consists of poorly drained soils that are very shallow over gravelly coarse sand. Permeability is rapid or very rapid in the underlying material. These soils formed in alluvium on river valley flood plains. Slopes range from 0 to 3 percent. Mean annual temperature is about 51 degrees F, and mean annual precipitation is about 23 inches at the type location.

#### **Typical Pedon**

Gothenburg loamy sand, on a slope of 0 to 2 percent. When described, the soil was moist throughout.

- A—0 to 3 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; many fine and medium roots; neutral; clear wavy boundary.
- C—3 to 8 inches; light brownish gray (10YR 6/2) coarse sand, grayish brown (10YR 5/2) moist; single grain; loose; 3 percent gravel, by volume; neutral; abrupt wavy boundary.
- 2Cg—8 to 80 inches; light gray (10YR 7/2) gravelly coarse sand, pale brown (10YR 6/3) moist; common medium prominent strong brown (7.5YR 5/6 moist) iron masses in the soil matrix; single grain; loose; 30 percent gravel, by volume; neutral.

#### **Type Location**

Kearney County, Nebraska; 10 miles north and 9 miles west of Minden; 1,000 feet north and 2,300 feet east of the southwest corner of sec. 16, T. 8 N., R. 16 W.; Alfalfa Center topographic quadrangle; lat. 40 degrees 39 minutes 30 seconds north and long. 99 degrees 7 minutes 51 seconds west.

#### **Range in Characteristics**

*Mean annual soil temperature:* 52 to 55 degrees F  
*Depth to gravelly sand:* Typically less than 10 inches; ranges from 1 to 20 inches  
*Depth to secondary calcium carbonate:* Calcium carbonate is in the upper part of the profile.

*Depth to endosaturation:* 0 to 1.5 feet; highest in early spring and winter, when stream flow is highest, and may recede to a depth of several feet during midsummer

#### *A horizon:*

Hue—10YR  
 Value—3 to 5 (2 or 3 moist)  
 Chroma—1 or 2  
 Texture—loam, fine sandy loam, sandy loam, loamy fine sand, loamy sand, fine sand, or sand; thin layers of clay loam in some pedons  
 Content of clay—2 to 8 percent  
 Content of rock fragments—0 to 5 percent  
 Reaction—neutral to moderately alkaline

#### *C horizon:*

Hue—10YR or 2.5Y  
 Value—6 to 8 (4 to 7 moist)  
 Chroma—1 to 3  
 Texture—fine sand, sand, or coarse sand; loam, fine sandy loam, loamy fine sand, or loamy sand in the upper part in some pedons  
 Depth to redox concentrations—distinct or prominent brown or yellowish brown iron masses in the matrix in most places  
 Content of rock fragments—0 to 15 percent gravel, by volume  
 Reaction—neutral to moderately alkaline

#### *2Cg horizon:*

Hue—10YR  
 Value—6 to 8 (4 to 7 moist)  
 Chroma—1 to 3  
 Texture—sand, gravelly coarse sand, or coarse sand  
 Content of rock fragments—some pedons contain thin strata of material that ranges up to 50 percent gravel, by volume  
 Reaction—neutral or slightly alkaline

### **Jankosh Series**

The Jankosh series consists of somewhat poorly drained, loamy alluvial soils that are moderately deep over gravelly sand. These soils are on river valley flood plains. Permeability is moderate in the loamy upper part and very rapid in the gravelly lower part. Slopes range from 0 to 2 percent. The mean annual temperature is 50 degrees F, and the mean annual precipitation is 17 inches at the type location.

#### **Typical Pedon**

Jankosh loam, 0 to 2 percent slopes, in an area of native grass:

- A—0 to 2 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable; slight effervescence; slightly alkaline; sodium adsorption ratio 8; abrupt smooth boundary.
- E—2 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, friable; slight effervescence; slightly alkaline; sodium adsorption ratio 5; abrupt smooth boundary.
- Btn—4 to 14 inches; grayish brown (10YR 5/2) sandy clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, firm; violent effervescence; very strongly alkaline; sodium adsorption ratio 19; clear smooth boundary.
- Bkn1—14 to 18 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak coarse prismatic structure; hard, firm; few fine distinct yellowish brown (10YR 5/6) irregularly shaped masses of iron accumulation with sharp to diffuse boundaries in the matrix; violent effervescence; sodium adsorption ratio 25; very strongly alkaline; clear smooth boundary.
- Bkn2—18 to 33 inches; very pale brown (10YR 7/3) very fine sandy loam, pale brown (10YR 6/3) moist; moderate medium prismatic structure; slightly hard, friable; few fine and medium distinct yellowish brown (10YR 5/6) irregularly shaped masses of iron accumulation with sharp to diffuse boundaries in the matrix; sodium adsorption ratio 15; few fine calcium carbonate accumulations; violent effervescence; very strongly alkaline; abrupt wavy boundary.
- 2Cg—33 to 80 inches; very pale brown (10YR 8/2) gravelly coarse sand, light gray (10YR 7/2) moist; single grain; loose; 26 percent gravel, by volume; neutral.

### Type Location

Garden County, Nebraska; about 0.5 mile south and 0.5 mile west of Oshkosh; 200 feet north and 2,575 feet east of the southwest corner of sec. 35, T. 17 N., R. 44 W.; Oshkosh topographic quadrangle; lat. 41 degrees 23 minutes 43 seconds north and long. 102 degrees 21 minutes 25 seconds west.

### Range in Characteristics

*Mean annual soil temperature:* 51 to 53 degrees F  
*Calcium carbonates:* Typically at the surface  
*Redox concentrations:* Occurring in the lower part of the Btn and Bkn horizons  
*Depth to endosaturation:* 1.5 to 3.0 feet  
*Thickness of the solum:* 20 to 36 inches

*Mollic epipedon:* 7 to 20 inches thick; may extend into the upper part of the Btn horizon

*Content of clay in the particle-size control section (weighted average):* 10 to 18 percent

*Depth to coarse sand or gravelly coarse sand:* 24 to 48 inches; averages 36 inches

#### A horizon:

Hue—10YR

Value—4 or 5 (3 or 4 moist)

Chroma—1 or 2

Texture—loam or very fine sandy loam

Content of clay—10 to 18 percent

Calcium carbonate equivalent—1 to 15 percent

SAR—0 to 9

Reaction—slightly alkaline or moderately alkaline

#### E horizon:

Hue—10YR

Value—6 or 7 (4 or 5 moist)

Chroma—6 or 7 (4 or 5 moist)

Texture—loam or very fine sandy loam

Content of clay—10 to 18 percent

Calcium carbonate equivalent—1 to 15 percent

SAR—0 to 9

Reaction—slightly alkaline or moderately alkaline

#### Btn horizon:

Hue—10YR

Value—4 to 6 (3 or 4 moist)

Chroma—2 or 3

Texture—very fine sandy loam, sandy clay loam, clay loam, or loam

Content of clay—10 to 18 percent

Calcium carbonate equivalent—5 to 15 percent

SAR—13 to 30

Reaction—strongly alkaline or very strongly alkaline

#### Bkn horizon:

Hue—10YR

Value—5 to 7 (4 to 6 moist)

Chroma—2 or 3

Texture—very fine sandy loam or loam

Content of clay—10 to 18 percent

Calcium carbonate equivalent—5 to 15 percent

SAR—13 to 30

Reaction—strongly alkaline or very strongly alkaline

#### 2Cg horizon:

Hue—10YR

Value—5 to 7 (4 to 6 moist)

Chroma—2 or 3

Texture—very fine sandy loam or loam

Content of rock fragments—5 to 25 percent gravel, by volume

Calcium carbonate equivalent—0 to 5 percent  
 SAR—0 to 6  
 Reaction—neutral or slightly alkaline

### **Jayem Series**

The Jayem series consists of very deep, well drained to somewhat excessively drained soils that formed in sediments weathered from noncalcareous sandstone. These soils are on uplands. Slopes range from 0 to 20 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is about 48 degrees F.

#### **Typical Pedon**

Jayem fine sandy loam, in an area of rangeland:

A—0 to 10 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; soft, very friable, nonsticky and nonplastic; neutral (pH 7.2); clear smooth boundary.

Bw—10 to 22 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; very few faint clay bridges between sand grains; neutral (pH 7.2); gradual wavy boundary.

C—22 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable; slightly alkaline (pH 7.4).

#### **Type Location**

Goshen County, Wyoming; 1,850 feet south and 45 feet west of the northeast corner of sec. 16, T. 30 N., R. 60 W.; lat. 42 degrees 34 minutes 40 seconds north and long. 104 degrees 3 minutes 51 seconds west.

#### **Range in Characteristics**

*Texture of the particle-size control section:* Loamy very fine sand, fine sandy loam, or very fine sandy loam with 5 to 18 percent clay, 5 to 35 percent silt, and 50 to 80 percent sand (more than 15 percent fine sand or coarser)

*Content of rock fragments:* 0 to 15 percent

*Reaction:* Neutral or slightly alkaline

*Mean annual soil temperature:* 47 to 56 degrees F

*Mean summer soil temperature:* 60 to 76 degrees F

*Thickness of the mollic epipedon:* 7 to 20 inches

*Other features:* Some pedons have buried horizons in the lower part of the series control section.

#### *A horizon:*

Hue—2.5Y or 10YR

Value—4 or 5 (2 or 3 moist)

Chroma—2 or 3

Texture—fine sandy loam or sandy loam; loamy sand, loamy fine sand, or loamy very fine sand in some pedons

#### *Bw horizon:*

Hue—2.5Y to 7.5YR

Value—4 to 6 (3 to 5 moist)

Chroma—2 to 4

Texture—fine sandy loam, sandy loam, loamy very fine sand, or very fine sandy loam; loam, silt loam, and sandy clay loam in some pedons in Nebraska

#### *C horizon:*

Hue—2.5Y to 7.5YR

Value—5 to 7 (4 to 6 moist)

Chroma—2 to 6 (dry and moist)

Texture—fine sandy loam, sandy loam, very fine sandy loam, or loamy very fine sand; some pedons have loamy sand, loamy fine sand, fine sand, or sand below a depth of 40 inches

Other features—less than 5 percent free carbonates below a depth of 40 inches in some pedons

### **Johnstown Series**

The Johnstown series consists of very deep, well drained soils that formed in loess and loamy sediments deposited on gravelly sand in the uplands. Permeability is moderate in the solum and rapid or very rapid in the underlying material. Slopes range from 0 to 6 percent. Mean annual temperature is about 48 degrees F, and mean annual precipitation is about 20 inches.

#### **Typical Pedon**

Johnstown loam, on a level slope of less than 1 percent, in an irrigated field of cultivated crops:

Ap—0 to 8 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak medium platy structure parting to weak fine granular; slightly hard, very friable; few fine and very fine roots; moderately acid; abrupt smooth boundary.

A—8 to 21 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; few fine and very fine roots; slightly acid; clear smooth boundary.

**Bt**—21 to 27 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, firm; few fine and very fine roots; patchy dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

**Btb1**—27 to 36 inches; very dark grayish brown (10YR 3/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, firm; patchy clay films on faces of peds; few fine and very fine roots; neutral; clear smooth boundary.

**Btb2**—36 to 44 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; patchy clay films on faces of peds; few very fine roots; grayish brown (10YR 5/2) worm castings; neutral; clear smooth boundary.

**BCb**—44 to 50 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; few very fine roots; few fine soft accumulations of carbonates; slight effervescence; slightly alkaline; abrupt wavy boundary.

**2C**—50 to 60 inches; light yellowish brown (10YR 6/4) gravelly coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose; neutral.

### Type Location

Brown County, Nebraska; about 4 miles east and 2 miles north of Ainsworth; 500 feet east and 100 feet south of the northwest corner of sec. 14, T. 30 N., R. 21 W.

### Range in Characteristics

*Thickness of the mollic epipedon:* 20 to 44 inches

*Thickness of the solum:* 30 to 55 inches

*Depth to the 2C horizon:* 40 to 60 inches

*Depth to carbonates:* 30 to more than 60 inches

*Depth to buried soil:* 14 to 36 inches

*Other features:* Some pedons have a BCKb horizon.

#### A horizon:

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 to 3

Texture—loam, fine sandy loam, clay loam, or silt loam

Reaction—moderately acid to neutral

#### Bt horizon:

Hue—10YR

Value—4 or 5 (3 moist)

Chroma—2 or 3

Texture—clay loam or silty clay loam; averages between 27 and 35 percent clay

Reaction—slightly acid or neutral

#### Btb1 horizon:

Hue—10YR

Value—3 or 4 (2 or 3 moist)

Chroma—1 or 2

Texture—clay loam or silty clay loam

Reaction—slightly acid or neutral

#### Btb2 horizon:

Hue—10YR or 2.5Y

Value—4 to 6 (3 to 5 moist)

Chroma—2 to 4

Texture—silty clay loam or clay loam; averages between 27 and 35 percent clay

Reaction—neutral or slightly alkaline

#### BCb horizon and C horizon (if it occurs):

Hue—10YR or 2.5Y

Value—5 to 7 (4 to 6 moist)

Chroma—2 to 4

Texture—loam, very fine sandy loam, silt loam, or silty clay loam

Reaction—neutral to moderately alkaline

#### 2C horizon:

Hue—10YR or 2.5Y

Value—5 to 7 (4 to 6 moist)

Chroma—2 to 4

Texture—gravelly coarse sand, coarse sand, sand, fine sand, loamy fine sand, or loamy sand

Content of rock fragments—0 to 35 percent gravel, by volume

Reaction—neutral or slightly alkaline

## Keith Series

The Keith series consists of very deep, well drained, moderately permeable soils that formed in loess. These soils are on upland hillslopes, tabeland plains, and valley terraces. Slopes range from 0 to 11 percent. Mean annual air temperature is 52 degrees F, and mean annual precipitation is 19 inches at the type location.

### Typical Pedon

Keith silt loam, on a slope of 1 percent, in a cultivated field:

- Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable; slightly acid; abrupt smooth boundary.
- A—5 to 9 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable; slightly acid; clear smooth boundary.
- Bt1—9 to 14 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; slightly hard, friable; few thin patchy clay films; neutral; clear smooth boundary.
- Bt2—14 to 23 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few thin patchy clay films; neutral; clear smooth boundary.
- BC—23 to 33 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; soft, very friable; violent effervescence; moderately alkaline; gradual smooth boundary.
- C—33 to 60 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; massive; soft, very friable; few accumulations and streaks of carbonate; strong effervescence; moderately alkaline.

### Type Location

Hitchcock County, Nebraska; 8 miles south and 5 miles west of Trenton; 1,100 feet south and 110 feet east of the northwest corner of sec. 13, T. 1 N., R. 34 W.

### Range in Characteristics

*Mean annual soil temperature:* 48 to 55 degrees F

*Depth to argillic horizon:* 6 to 20 inches

*Depth to secondary calcium carbonate:* 15 to 38 inches

*Thickness of the mollic epipedon:* 7 to 20 inches; typically the upper part of the B horizon

*Thickness of the solum:* 15 to 48 inches

*Content of clay in the particle-size control section (weighted average):* 20 to 35 percent

#### A horizon:

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 to 3

Texture—silt loam; less commonly loam, very fine sandy loam, or fine sandy loam

Content of clay—14 to 20 percent

Reaction—slightly acid or neutral

#### Bt1 horizon:

Hue—10YR or 7.5YR

Value—4 or 5 (2 to 4 moist)

Chroma—2 or 3

Texture—silt loam, silty clay loam, loam, or clay loam

Content of clay—20 to 35 percent

Reaction—neutral or slightly alkaline

#### Bt2 horizon:

Hue—10YR or 7.5YR

Value—5 or 6 (4 or 5 moist)

Chroma—2 or 3

Texture—silt loam, silty clay loam, loam, or clay loam

Content of clay—20 to 35 percent

Reaction—neutral or slightly alkaline

#### BC, Bk, and BCK horizons:

Hue—10YR or 2.5Y

Value—5 to 7 (3 to 6 moist)

Chroma—2 or 3

Texture—loam, very fine sandy loam, silty clay loam, silt loam, or clay loam

Reaction—slightly alkaline or moderately alkaline; accumulations of secondary carbonates in the Bk and BCK horizons

#### C horizon:

Hue—10YR or 2.5Y

Value—6 to 8 (5 or 6 moist)

Chroma—2 to 4

Texture—silt loam, loam, or very fine sandy loam; a buried soil is below a depth of 40 inches in some pedons

Calcium carbonate equivalent—5 to 15 percent

Reaction—slightly alkaline or moderately alkaline in the upper part and strongly alkaline in the lower part; accumulations of carbonate in some pedons

### Kuma Series

The Kuma series consists of very deep, well drained soils that formed in medium or moderately fine textured, calcareous eolian deposits. An age discontinuity is marked by a paleosol. These soils are on tableland plains and upland hillslopes. Slopes range from 0 to 8 percent. The mean annual precipitation is about 16 inches, and the mean annual temperature is about 50 degrees F.

### Typical Pedon

Kuma silt loam (fig. 6), in a cultivated area:

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam,



Figure 6.—A profile of a Kuma soil.

very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to fine granular; soft, very friable, slightly sticky and slightly plastic; neutral (pH 7.0); clear smooth boundary.

BA—5 to 10 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few faint clay films on faces of peds and few faint clay films on the inside of some root channels and pores; neutral (pH 7.0); gradual smooth boundary.

Bt—10 to 20 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common faint clay films on faces of peds

and clay films filling root channels and pores; neutral (pH 7.2); abrupt smooth boundary.

Btb—20 to 30 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; strong fine prismatic structure parting to fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common distinct clay films on faces of peds and filling root channels and pores; slightly alkaline (pH 7.4); clear smooth boundary.

Btkb1—30 to 45 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; moderate fine prismatic structure parting to fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; few faint clay films on faces of peds and filling root channels and pores; visible secondary calcium carbonate occurring mostly as concretions or as coatings on faces of peds; faces of peds are strongly effervescent, but interiors are not effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Btkb2—45 to 50 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few faint clay films on faces of peds and in root channels and pores; visible secondary calcium carbonate in structural cracks and on faces of peds; peds are effervescent throughout; violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bkb—50 to 60 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; secondary calcium carbonate occurring as soft masses, concretions, and thin seams and streaks; violently effervescent; moderately alkaline (pH 8.2).

### Type Location

Washington County, Colorado; 2,140 feet west and 70 feet north of the southeast corner of sec. 1, T. 2 N., R. 52 W.

### Range in Characteristics

*Mean annual soil temperature:* 48 to 53 degrees F

*Depth to the base of the argillic horizon:* 27 to 60 inches

*Depth to secondary calcium carbonate:* 10 to 40 inches

*Depth to continuous subhorizons of visible secondary calcium carbonate and/or sulfate:* 20 to 40 inches

*Depth to the mollic epipedon:* 20 to 50 inches

*Content of clay in the particle-size control section (weighted average):* 18 to 35 percent

*A horizon:*

Hue—2.5Y to 7.5YR  
 Value—3 to 5 (2 or 3 moist)  
 Chroma—1 to 3  
 Texture—silt loam, loam, or very fine sandy loam  
 Reaction—slightly acid to slightly alkaline

*Bt horizon:*

Hue—2.5Y to 7.5YR  
 Value—3 to 5 (2 or 3 moist)  
 Chroma—1 to 3 (2 or 3 moist)  
 Texture—loam, clay loam, silt loam, or silty clay loam  
 Content of clay—18 to 35 percent  
 Content of silt—35 to 70 percent  
 Content of sand—5 to 40 percent; less than 15 percent fine or coarser sand  
 Reaction—neutral to moderately alkaline

*Btb and Btkb horizons:*

Hue—5Y to 7.5YR; subhorizons redder than 7.5YR in some pedons  
 Value—4 to 7 (2 to 6 moist)  
 Chroma—1 to 4  
 Texture—silt loam, loam, or silty clay loam  
 Content of clay—18 to 35 percent  
 Content of silt—35 to 70 percent  
 Content of sand—5 to 40 percent; less than 15 percent fine or coarser sand  
 Reaction—neutral to moderately alkaline; visible secondary carbonate commonly occurs in some part  
 Calcium carbonate equivalent—0 to 14 percent

*Bk horizon:*

Hue—5Y to 7.5YR; subhorizons redder than 7.5YR in some pedons  
 Value—4 to 7 (2 to 6 moist)  
 Chroma—1 to 4  
 Texture—loam, silt loam, or silty clay loam  
 Content of clay—10 to 35 percent  
 Content of silt—30 to 70 percent  
 Content of sand—5 to 50 percent; less than 35 percent fine or coarser sand  
 Reaction—neutral to moderately alkaline

*C horizon:*

Hue—5Y to 7.5YR  
 Value—4 to 7 (2 to 6 moist)  
 Chroma—1 to 4  
 Texture—loam, silt loam, or silty clay loam  
 Calcium carbonate equivalent—1 to 14 percent  
 Reaction—moderately alkaline or strongly alkaline

**Las Animas Series**

The Las Animas series consists of deep, poorly drained and somewhat poorly drained soils that formed in thick, calcareous, stratified alluvial materials derived from mixed sources. These soils are on valley flood plains and low stream terraces. Slopes range from 0 to 6 percent. The mean annual precipitation is about 15 inches, and the mean annual temperature is about 53 degrees F.

**Typical Pedon**

Las Animas sandy loam, in an area of grassland:

- A—0 to 6 inches; gray (N 5/0) sandy loam, dark gray (N 4/0) moist; moderate fine granular structure; soft, very friable; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
- ACg—6 to 10 inches; light brownish gray (2.5Y 6/2) sandy loam stratified with loamy sand and loam; grayish brown (2.5Y 5/2) moist; common medium prominent yellowish brown (10YR 5/4 moist) mottles; weak coarse subangular blocky structure parting to weak fine granular; slightly hard, very friable; strongly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.
- Ckyg—10 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam stratified with loamy sand and loam; grayish brown (2.5Y 5/2) moist; many coarse prominent light olive brown (2.5Y 5/6 moist) and gray (N 5/0 moist) mottles; massive; soft, very friable; accumulation of visible secondary carbonate and sulfate in the form of crystals and concretions; strongly effervescent; moderately alkaline (pH 8.2).

**Type Location**

Bent County, Colorado; 2,640 feet south of the northwest corner of sec. 6, T. 23 S., R. 51 W.

**Range in Characteristics**

*Mean annual soil temperature:* 49 to 55 degrees F

*Mean summer soil temperature:* 73 degrees F

*Depth to secondary calcium carbonate:* 10 to 18 inches

*Depth to endosaturation:* 0 to 3.5 feet

*Conductivity:* 2 to more than 15 mmhos/cm; typically ranges from 4 to 16 mmhos/cm

*Content of gypsum in the particle-size control section (weighted average):* 0 to 5 percent

*Other features:* Continuous subhorizons with visible salt accumulation may occur at any depth.

*A horizon:*

Hue—5Y to 7.5YR or N  
 Value—4 to 6 (3 or 4 moist)  
 Chroma—0 to 2  
 Texture—loam or fine sandy loam  
 Reaction—moderately alkaline

*C horizon:*

Hue—5Y to 7.5YR  
 Value—3 to 7 (5 or 6 moist)  
 Chroma—1 to 3  
 Texture—fine sandy loam or sandy loam with  
   strata of fine sand, silt loam, loam, loamy sand,  
   or loamy fine sand  
 Content of clay—8 to 18 percent  
 Calcium carbonate equivalent—1 to 10 percent  
 Reaction—moderately alkaline

**Lexsworth Series**

The Lexsworth series consists of very deep, moderately well drained soils on river valley flood plains. These soils formed in 20 to 40 inches of loamy alluvium deposited over coarse sand or gravelly coarse sand. Permeability is moderate in the solum and very rapid in the substratum. Slopes range from 0 to 2 percent. Mean annual temperature is about 50 degrees F, and mean annual precipitation is about 17 inches at the type location.

**Typical Pedon**

Lexsworth loam, on a slope of less than 1 percent, in an area of irrigated cropland:

- Ap—0 to 12 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; moderate medium and fine granular structure; hard, friable; slightly alkaline; abrupt smooth boundary.
- C1—12 to 19 inches; gray (10YR 5/1) sandy clay loam, very dark grayish brown (10YR 4/2) moist; massive; violent effervescence; moderately alkaline; clear wavy boundary.
- C2—19 to 26 inches; coarse sandy loam, brown (10YR 5/3) moist; few fine distinct brown (7.5YR 4/4) redox features; massive; violent effervescence; moderately alkaline; clear wavy boundary.
- C3—26 to 33 inches; coarse sand, light yellowish brown (2.5Y 6/3) moist; single grain; violent effervescence; common medium distinct brown (7.5YR 4/4) redox features; slightly alkaline; abrupt wavy boundary.
- C4—33 to 52 inches; stratified coarse sand, pale brown (10YR 6/3) moist; single grain; common

medium prominent light olive brown (2.5Y 5/6) redox features; slightly alkaline; abrupt wavy boundary.

C5—52 to 60 inches; stratified fine sand, light brownish gray (10YR 6/2) moist; single grain; common medium prominent light olive brown (2.5Y 5/6) redox features; neutral; abrupt wavy boundary.

C6—60 to 80 inches; stratified coarse sand, pale brown (10YR 6/3) moist; neutral; single grain.

**Type Location**

Deuel County, Nebraska, 1 mile south of Big Springs; 600 feet west and 600 feet south of the northeast corner of sec. 2, T. 12 N., R. 42 W.; USGS topographic quadrangle Big Springs NECO; lat. 41 degrees 2 minutes 43 seconds north and long. 102 degrees 4 minutes 23 seconds west.

**Range in Characteristics**

*Mean annual soil temperature:* 51 to 53 degrees F

*Depth to secondary calcium carbonate:* 10 to 20 inches

*Depth to endosaturation:* 5 to 8 feet

*Thickness of the mollic epipedon:* 10 to 20 inches

*Depth to coarse sand or gravelly coarse sand:* 20 to 40 inches

*Other features:* Some pedons have an AC horizon.

*A horizon:*

Hue—10YR  
 Value—3 to 5 (2 or 3 moist)  
 Chroma—1 to 3 (dry or moist)  
 Texture—loam or clay loam  
 Reaction—neutral to moderately alkaline

*Upper part of C horizon:*

Hue—10YR or 2.5Y  
 Value—5 to 7 (4 to 6 moist)  
 Chroma—1 to 3 (dry or moist)  
 Texture—sandy clay loam, loam, clay loam, coarse sandy loam, fine sandy loam, or sandy loam; commonly stratified with varying colors and textures  
 Content of clay—8 to 18 percent  
 Reaction—slightly acid to moderately alkaline  
 Other features—common distinct or prominent redoximorphic features with hue of 2.5YR or 7.5YR, value of 3 to 6 moist, and chroma of 3 to 8 (dry or moist)

*Lower part of C horizon:*

Hue—10YR or 2.5Y  
 Value—6 to 8 (5 to 7 moist)  
 Chroma—2 to 4 (dry or moist)

Texture—coarse sand, fine sand, sand, or gravelly coarse sand

Reaction—neutral to moderately alkaline

Content of gravel—15 to 35 percent, by volume

### **Lodgepole Series**

The Lodgepole series consists of very deep, somewhat poorly drained, very slowly permeable soils that formed in loess and loamy sediments. These soils are in upland depressions and on playas. Slopes are 0 to 1 percent. Mean annual air temperature is about 51 degrees F, and mean annual precipitation is about 17 inches at the type location.

#### **Typical Pedon**

Lodgepole silty clay loam, on a concave slope of less than 1 percent, in a cultivated field:

Ap—0 to 5 inches; gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable; many very fine roots; slightly acid; abrupt smooth boundary.

Bt1—5 to 9 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; strong fine and medium angular blocky structure; very hard, very firm; patchy clay films on faces of peds; many very fine roots; slightly acid; clear smooth boundary.

Bt2—9 to 24 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; few fine distinct brown (7.5YR 4/4 moist) iron masses in the soil matrix; strong coarse prismatic structure parting to strong fine subangular blocky; very hard, very firm; patchy clay films on faces of peds; few very fine roots; slightly acid; diffuse wavy boundary.

Bt3—24 to 38 inches; dark grayish brown (10YR 4/2) silty clay, very dark brown (10YR 2/2) moist; common fine distinct brown (7.5YR 4/4 moist) iron masses in the soil matrix; strong coarse prismatic structure parting to moderate medium and fine subangular blocky; very hard, very firm; patchy clay films on faces of peds; neutral; clear wavy boundary.

Bt4—38 to 45 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; dark organic stains on faces of peds; neutral; gradual wavy boundary.

BC—45 to 54 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable;

dark organic stains on ped faces; neutral; gradual wavy boundary.

C—54 to 80 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 4/3) moist; massive; soft, very friable; slightly alkaline.

#### **Type Location**

Dundy County, Nebraska; about 17 miles north and 4 miles east of Benkelman; 2,500 feet east and 750 feet north of the southwest corner of sec. 24, T. 4 N., R. 37 W.; USGS topographic quadrangle; lat. 40 degrees 17 minutes 40 seconds north and long. 101 degrees 26 minutes 46 seconds west.

#### **Range in Characteristics**

*Mollic epipedon*: 20 to 50 inches thick; extends through the Bt horizon

*Depth to carbonates*: Typically more than 40 inches; ranges from 30 to more than 60 inches

*Other features*: Pedons in undisturbed areas commonly have a thin E horizon. Some pedons have a Bk horizon.

#### *A horizon*:

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 or 2

Texture—silt loam or silty clay loam

Reaction—slightly acid to slightly alkaline

#### *Bt horizon*:

Hue—10YR or 2.5Y

Value—3 to 5 (2 to 4 moist)

Chroma—1 or 2

Texture—silty clay or silty clay loam averaging between 35 and 50 percent clay; the range includes clay and clay loam

Reaction—slightly acid to slightly alkaline

#### *BC horizon (if it occurs)*:

Colors and textures—intermediate between those of the Bt and C horizons; dark organic stains common on faces of peds

Reaction—neutral to moderately alkaline

#### *C horizon*:

Hue—10YR or 2.5Y

Value—5 to 8 (4 to 7 moist)

Chroma—2 to 4

Texture—silt loam, loam, or very fine sandy loam; fine sandy loam, sandy loam, loamy very fine sand, loamy fine sand, or loamy sand below a depth of 40 inches in some pedons

Other features—coatings of carbonates on cleavage planes in some pedons

Reaction—neutral to moderately alkaline

### **McConaughy Series**

The McConaughy series consists of deep, well drained, moderately permeable soils on upland hillslopes. These soils formed in calcareous loess. Slopes range from 3 to 15 percent. Mean annual precipitation is about 18 inches, and mean annual temperature is about 50 degrees F at the type location.

#### **Typical Pedon**

McConaughy loam, on a slope of 12 percent; on a lower backslope in an area of rangeland:

- A1—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; neutral; clear smooth boundary.
- A2—6 to 13 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; neutral; clear smooth boundary.
- Bw1—13 to 17 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; slight effervescence; slightly alkaline; clear smooth boundary.
- Bw2—17 to 22 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; strong effervescence; moderately alkaline; gradual wavy boundary.
- BC—22 to 34 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few small soft white accumulations of carbonates; violent effervescence; strongly alkaline; gradual wavy boundary.
- C1—34 to 40 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable; few small soft white accumulations of carbonates; strong effervescence; moderately alkaline; diffuse wavy boundary.
- C2—40 to 60 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable; few small soft white

accumulations of carbonates; strong effervescence; strongly alkaline.

#### **Type Location**

Keith County, Nebraska; about 7 miles west and 8 miles north of Brule; 475 feet east and 1,260 feet south of the northwest corner of sec. 4, T. 14 N., R. 41 W.

#### **Range in Characteristics**

*Mean annual soil temperature:* 51 to 53 degrees F

*Thickness of the mollic epipedon:* 7 to 20 inches

*Depth to secondary calcium carbonate:* 10 to 18 inches

*Depth to cambic horizon:* 7 to 20 inches

*Content of clay:* 10 to 18 percent

*Other features:* Some pedons have a Bk horizon.

#### *A horizon:*

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—2 or 3

Texture—loam or very fine sandy loam

Reaction—neutral or slightly alkaline

#### *Bw horizon:*

Hue—10YR

Value—5 to 7 (4 or 5 moist)

Chroma—2 or 3

Texture—loam or very fine sandy loam

Content of clay—10 to 18 percent

Reaction—slightly alkaline or moderately alkaline

#### *BC and C horizons:*

Hue—10YR

Value—5 to 7 (4 or 5 moist)

Chroma—2 to 4

Texture—loam or very fine sandy loam

Calcium carbonate equivalent—1 to 5 percent

Reaction—moderately alkaline or strongly alkaline

### **Merrick Series**

The Merrick series consists of very deep, moderately well drained soils on river valley flood plains. These soils formed in stratified silty and loamy alluvium. Permeability is moderate. Slopes range from 0 to 2 percent. Mean annual temperature is 52 degrees F, and mean annual precipitation is 25 inches at the type location.

#### **Typical Pedon**

Merrick loam, on a slope of less than 1 percent, in a field of irrigated cropland:

- Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; slightly hard, friable; slightly acid; abrupt smooth boundary.
- A1—7 to 12 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine and medium granular structure; slightly hard, friable; neutral; clear smooth boundary.
- A2—12 to 30 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, friable; neutral; clear smooth boundary.
- C1—30 to 42 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium blocky structure; slightly hard, friable; neutral; clear smooth boundary.
- C2—42 to 48 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; few fine faint yellowish brown (10YR 5/4 moist) iron masses in matrix; weak coarse blocky structure; hard, friable; neutral; clear smooth boundary.
- C3—48 to 80 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; few fine distinct yellowish brown (10YR 5/4 moist) iron masses in matrix; massive; slightly hard, friable; slightly acid.

### Type Location

Merrick County, Nebraska; about 1/2 mile south and 1 1/2 miles east of Chapman; 100 feet south and 100 feet east of the northwest corner of sec. 16, T. 12 N., R. 7 W.

### Range in Characteristics

*Mean annual soil temperature:* 51 to 55 degrees F

*Thickness of the mollic epipedon:* 20 to 38 inches

*Depth to secondary calcium carbonate:* 40 to 60 inches

*Depth to redox concentrations:* 20 to 38 inches

*Depth to endosaturation:* 4 to 6 feet

*Thickness of the solum:* 20 to 38 inches

*Content of clay:* 27 to 35 percent

*Other features:* Some pedons have thin strata of alluvium, between depths of 30 and 60 inches, that contain small amounts of free carbonates. Some pedons have an AC horizon, which has textures similar to those of the A horizon and has slightly lighter colors.

#### A horizon:

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 or 2 (dry or moist)

Texture—loam, silt loam, clay loam, or sandy clay loam

Reaction—slightly acid or neutral

#### C horizon:

Hue—10YR or 2.5Y

Value—5 to 7 (4 to 6 moist)

Chroma—2 or 3 (dry or moist)

Texture—loam or silt loam; clay loam, fine sandy loam, sandy loam, and coarser textures below a depth of 40 inches in some pedons

Reaction—slightly acid or neutral throughout the C horizon; strata that are slightly calcareous are slightly alkaline or moderately alkaline

Other features—few or common faint or distinct iron masses in the matrix below a depth of 30 inches

### Platte Series

The Platte series consists of somewhat poorly drained soils that are shallow over coarse sand or gravelly coarse sand. These soils formed in sandy and loamy alluvium deposited over coarse sand or gravelly sand on river valley flood plains. Permeability is moderate or moderately rapid in the upper part and very rapid in the lower part. Slopes range from 0 to 3 percent. Mean annual temperature is about 51 degrees F, and mean annual precipitation is about 25 inches at the type location.

### Typical Pedon

Platte loam, on a slope of less than 1 percent, in an area of irrigated cropland. When described, the soil was moist throughout.

Ap—0 to 5 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, friable; strong effervescence; moderately alkaline; abrupt smooth boundary.

A—5 to 8 inches; dark gray (10YR 4/1) very fine sandy loam, very dark gray (10YR 3/1) moist; common medium distinct brown (7.5YR 5/4) iron masses in the soil matrix; weak medium and fine granular structure; soft, very friable; strong effervescence; moderately alkaline; clear smooth boundary.

C—8 to 16 inches; light gray (10YR 7/2) very fine sandy loam, grayish brown (10YR 5/2) moist; common fine to coarse distinct brown (7.5YR 5/4) iron masses in the matrix; massive; soft, very friable; strata of loamy sand in the lower part; strong effervescence; moderately alkaline; gradual smooth boundary.

2Cg—16 to 80 inches; light gray (10YR 7/2) gravelly coarse sand, light brownish gray (10YR 6/2) moist; single grain; loose; slightly alkaline.

### Type Location

Adams County, Nebraska; about 4 miles north and 2½ miles west of Kenesaw; about 1,300 feet west and 1,050 feet north of the southeast corner of sec. 6, T. 8 N., R. 12 W.; Denman topographic quadrangle; lat. 40 degrees 41 minutes 9 seconds north and long. 98 degrees 42 minutes 35 seconds west.

### Range in Characteristics

*Mean annual soil temperature:* 49 to 56 degrees F

*Thickness of mollic colors:* 6 to 9 inches; corresponds to the thickness of the A horizon

*Depth to coarse sand, gravelly coarse sand, or gravelly sand:* 10 to 20 inches

*Depth to secondary calcium carbonate:* Calcium carbonate typically disseminated throughout the A horizon; does not occur in some pedons

*Depth to endosaturation:* 1 to 3 feet

*Content of gravel:* Typically 15 to 35 percent, by volume, at a depth of more than 20 inches; ranges from 2 to 35 percent

*Other features:* Some pedons have an AC horizon.

#### A horizon:

Hue—10YR or 2.5Y

Value—4 or 5 (2 or 3 moist)

Chroma—1 or 2 (dry or moist)

Texture—loam, fine sandy loam, silty clay loam, silt loam, very fine sandy loam, sandy loam, loamy fine sand, or loamy sand

Reaction—dominantly moderately alkaline but ranges from neutral to moderately alkaline

#### C horizon:

Hue—10YR or 2.5Y

Value—6 to 8 (4 to 6 moist)

Chroma—1 to 3 (dry or moist)

Texture—loam, very fine sandy loam, fine sandy loam, or sandy loam; loamy fine sand, loamy sand, or sand in the lower part in some pedons

Content of rock fragments—0 to 5 percent gravel, by volume

Calcium carbonate equivalent—0 to 10 percent

Reaction—dominantly moderately alkaline but ranges from neutral to moderately alkaline

Other features—grayish and brownish redoximorphic features

#### 2Cg horizon:

Hue—10YR or 2.5Y

Value—6 to 8 (4 to 6 moist)

Chroma—1 to 4 (dry or moist)

Texture—coarse sand, gravelly coarse sand, or gravelly sand

Content of rock fragments—typically 15 to 35

percent gravel, by volume, but ranges from 2 to 35 percent; the upper part commonly contains less gravel than the lower part; stratification of the sandy and gravelly layers is common

Calcium carbonate equivalent—0 to 5 percent

Reaction—dominantly neutral or slightly alkaline but ranges from neutral to moderately alkaline

### Ralton Series

The Ralton series consists of very deep, moderately well drained, moderately permeable soils that formed in stratified, calcareous alluvium. These soils are on valley flood plains. Slopes range from 0 to 3 percent. Mean annual temperature is 49 degrees F, and mean annual precipitation is 17 inches at the type location.

### Typical Pedon

Ralton loam, on a slope of less than 1 percent, in a cultivated field:

Ap1—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable; violent effervescence; slightly alkaline; abrupt smooth boundary.

Ap2—6 to 14 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable; violent effervescence; slightly alkaline; abrupt smooth boundary.

C1—14 to 24 inches; grayish brown (10YR 5/2) and light brownish gray (10YR 6/2), stratified very fine sandy loam and loam, brown (10YR 4/3 and 5/3) moist; weak fine granular structure; soft, very friable; violent effervescence; moderately alkaline; abrupt smooth boundary.

C2—24 to 34 inches; light brownish gray (10YR 6/2) and light gray (10YR 7/2) very fine sandy loam, brown (10YR 5/3) and pale brown (10YR 6/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline; abrupt smooth boundary.

C3—34 to 51 inches; stratified dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), light brownish gray (10YR 6/2), and light gray (10YR 7/2) loam, black (10YR 2/1), very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), and dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure parting to weak fine granular; soft, very friable; violent effervescence; moderately alkaline; abrupt smooth boundary.

C4—51 to 71 inches; stratified light gray (2.5Y 7/1 and 10YR 7/2) very fine sandy loam, grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) moist; massive; soft, very friable; violent effervescence; slightly alkaline; abrupt smooth boundary.

C5—71 to 80 inches; light gray (2.5Y 7/2) gravelly loamy coarse sand, gray (2.5Y 5/1) moist; single grain; loose; slightly alkaline.

### Type Location

Deuel County, Nebraska; 1.5 miles south and 0.5 mile east of Chappell; 2,500 feet south and 1,800 feet east of the northwest corner of sec. 26, T. 13 N., R. 45 W.; USGS topographic quadrangle Chappell NE; lat. 41 degrees 4 minutes 13 seconds north and long. 102 degrees 27 minutes 00 seconds west.

### Range in Characteristics

*Mean annual soil temperature:* 49 to 55 degrees F

*Depth to secondary calcium carbonate:* 0 to 10 inches

*Depth to endosaturation:* 3 to 6 feet

*Thickness of the solum:* 10 to 24 inches

*Thickness of the mollic epipedon:* 10 to 20 inches

#### A horizon:

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 or 2

Texture—loam or very fine sandy loam

Calcium carbonate equivalent—0 to 10 percent

Reaction—neutral to moderately alkaline

#### AC horizon:

Hue—10YR

Value—4 to 7 (3 to 6 moist)

Chroma—2 or 3

Texture—loam or very fine sandy loam

Reaction—slightly alkaline or moderately alkaline

#### C horizon:

Hue—10YR

Value—4 to 7 (3 to 6 moist)

Chroma—2 or 3

Texture—loam or very fine sandy loam; sandy loam and coarser textures below a depth of 60 inches in some areas

Reaction—slightly alkaline or moderately alkaline

Other features—a buried soil or thin strata of slightly coarser or finer textured material in the C horizon in most pedons

## Richfield Series

The Richfield series consists of very deep, well drained, moderately slowly permeable soils. These soils formed in calcareous loess on tableland plains.

### Typical Pedon

Richfield silt loam, in a cultivated field:

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly plastic and slightly sticky; neutral; clear smooth boundary.

Bt—6 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, plastic and sticky; common fine faint clay films; slightly alkaline; gradual smooth boundary.

Bck1—16 to 20 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm; few soft accumulations of carbonate; strong effervescence; moderately alkaline; clear smooth boundary.

Bck2—20 to 30 inches; light gray (10YR 7/2) silty clay loam, grayish brown (10YR 5/2) moist; weak granular structure; slightly hard, friable; few soft accumulations of carbonate; strong effervescence; moderately alkaline; gradual smooth boundary.

C—30 to 60 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable; porous; strong effervescence; strongly alkaline.

### Type Location

Grant County, Kansas; 9 miles east and 3 miles north of Ulysses; 1,000 feet west and 100 feet south of the northeast corner of sec. 12, T. 28 S., R. 36 W.

### Range in Characteristics

*Mean annual soil temperature:* 47 to 59 degrees F

*Depth to secondary calcium carbonate:* 10 to 24 inches

*Thickness of the mollic epipedon:* 9 to 20 inches

*Thickness of the solum:* 16 to 37 inches

*Other features:* CEC/clay ratios are less than 90 me/100g in the solum. Eroded and dry phases are recognized.

*Content of clay in the particle-size control section (weighted average):* 35 to 42 percent

*Other features:* Some pedons have a thin transitional horizon between the A and Bt horizons.

*A horizon:*

Hue—10YR  
Value—4 or 5 (2 or 3 moist)  
Chroma—2 or 3  
Texture—silt loam, silty clay loam, clay loam, loam, very fine sandy loam, or fine sandy loam  
Reaction—neutral or slightly alkaline

*Bt horizon:*

Hue—10YR  
Value—4 or 5 (3 or 4 moist)  
Chroma—2 or 3  
Texture—silty clay loam or silty clay (averages 35 to 42 percent clay)  
Content of clay—35 to 42 percent  
Reaction—neutral to moderately alkaline

*Bk or Bck horizon:*

Hue—10YR  
Value—5 to 7 (4 to 6 moist)  
Chroma—2 or 3  
Texture—silty clay loam or silt loam  
Content of clay—20 to 32 percent  
Reaction—slightly alkaline or moderately alkaline

*C horizon:*

Hue—10YR  
Value—6 to 8 (4 to 6 moist)  
Chroma—2 to 4  
Texture—silty clay loam, clay loam, or silt loam  
Calcium carbonate equivalent—10 to 15 percent  
Reaction—moderately alkaline or strongly alkaline  
Other features—the horizon is typically calcareous loess, but in some pedons where the loess mantle is thin, contrasting material is between depths of 40 and 60 inches. In some pedons the substratum has buried horizons.

## Rosebud Series

The Rosebud series consists of well drained soils that are moderately deep to weakly cemented, fine grained sandstone. These soils formed in loess and loamy, calcareous residuum derived from weakly cemented, fine grained sandstone. They are on tableland plains and upland hillslopes. Permeability is moderate. Slopes range from 0 to 20 percent. Mean annual precipitation is about 16 inches, and mean annual temperature is about 51 degrees F.

### Typical Pedon

Rosebud loam (fig. 7), on a slope of less than 1 percent, in a cultivated field:



Figure 7.—Profile of Rosebud loam, which formed in loess and sandstone residuum.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; slightly alkaline; abrupt smooth boundary.

Bt—6 to 11 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm; thin discontinuous films on faces of peds; common very dark grayish brown (10YR 3/2) wormcasts; slightly alkaline; clear smooth boundary.

Bk1—11 to 15 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, friable; few fine pebbles; secondary calcium carbonates occurring as soft masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.

Bk2—15 to 19 inches; very pale brown (10YR 7/3)

sandy clay loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; soft, very friable; secondary calcium carbonates occurring as soft masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.

C—19 to 30 inches; very pale brown (10YR 7/3) sandy loam, light yellowish brown (10YR 6/4) moist; massive; soft, very friable; many pebbles and hard caliche fragments; disseminated lime and lime coatings on pebbles; violent effervescence; moderately alkaline; abrupt wavy boundary.

Cr—30 to 80 inches; reddish yellow (7.5YR 6/6), weakly cemented sandstone; few small pebbles; violent effervescence; moderately alkaline.

### Type Location

Kimball County, Nebraska; about 8 miles south and 2 miles east of Kimball; 1,920 feet west and 150 feet north of the southeast corner of sec. 4, T. 13 N., R. 55 W.

### Range in Characteristics

*Mean annual soil temperature:* 49 to 55 degrees F  
*Depth to paralithic contact:* 20 to 40 inches  
*Depth to secondary calcium carbonate:* 9 to 30 inches  
*Thickness of the solum:* 12 to 34 inches  
*Thickness of the mollic epipedon:* 7 to 20 inches  
*Content of clay in the particle-size control section (weighted average):* 23 to 35 percent

#### A horizon:

Hue—10YR  
 Value—4 or 5 (2 or 3 moist)  
 Chroma—2 or 3  
 Texture—loam; less commonly silt loam or fine sandy loam  
 Reaction—neutral to moderately alkaline

#### Bt horizon:

Hue—10YR  
 Value—4 to 7 (3 to 6 moist)  
 Chroma—2 or 3  
 Texture—clay loam or loam  
 Content of clay—23 to 35 percent  
 Reaction—neutral to moderately alkaline

#### Bk or BC horizon:

Hue—10YR  
 Value—5 to 7 (4 to 6 moist)  
 Chroma—2 or 3  
 Texture—loam or sandy clay loam  
 Calcium carbonate equivalent—0 to 5 percent  
 Reaction—slightly alkaline or moderately alkaline

#### C horizon:

Hue—10YR

Value—6 or 7 (5 or 6 moist)

Chroma—3 or 4

Texture—sandy clay loam or sandy loam; less commonly very fine sandy loam or loam

Calcium carbonate equivalent—1 to 15 percent

Reaction—slightly alkaline or moderately alkaline

#### Cr horizon:

Value—7 or 8 (6 or 7 moist)

Chroma—1 to 6

Reaction—slightly alkaline or moderately alkaline

## Sarben Series

The Sarben series consists of very deep, well drained, moderately rapidly permeable soils that formed in reworked loamy and sandy sediments in the sand-loess transition areas. These soils are on uplands. Slopes range from 0 to 60 percent. Mean annual temperature is about 49 degrees F, and mean annual precipitation is about 16 inches.

### Typical Pedon

Sarben loamy very fine sand, on a convex slope of 5 percent, in an area of native grassland:

A—0 to 7 inches; brown (10YR 5/3) loamy very fine sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary.

AC—7 to 16 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak fine granular; soft, very friable; neutral; clear smooth boundary.

C1—16 to 29 inches; very pale brown (10YR 7/3) loamy very fine sand, brown (10YR 5/3) moist; massive; soft, very friable; slightly alkaline; clear smooth boundary.

C2—29 to 80 inches; very pale brown (10YR 7/3) loamy very fine sand, brown (10YR 5/3) moist; massive; soft, very friable; slight effervescence; moderately alkaline.

### Type Location

Banner County, Nebraska; about 12 miles east and 6 miles north of Harrisburg; 600 feet west and 600 feet north of the southeast corner of sec. 2, T. 19 N., R. 54 W.; Wright Gap topographic quadrangle; lat. 41 degrees 38 minutes 36 seconds north and long. 103 degrees 30 minutes 15 seconds west.

### Range in Characteristics

*Depth to carbonates:* 15 to 40 inches

*A horizon:*

Hue—10YR  
 Value—4 to 6 (3 to 5 moist)  
 Chroma—2 or 3  
 Texture—very fine sandy loam, fine sandy loam,  
 loamy very fine sand, or loamy fine sand  
 Reaction—slightly acid or neutral

*AC horizon (if it occurs):*

Hue—10YR  
 Value—5 or 6 (4 or 5 moist)  
 Chroma—2 or 3  
 Texture—fine sandy loam, loamy very fine sand,  
 or very fine sandy loam  
 Reaction—neutral or slightly alkaline

*C horizon:*

Hue—10YR  
 Value—5 to 8 (4 to 6 moist)  
 Chroma—2 or 3  
 Texture—fine sandy loam, loamy very fine sand,  
 or very fine sandy loam; strata of sandy loam  
 below a depth of 30 inches in some pedons;  
 sandy textures below a depth of 40 inches in  
 some pedons  
 Reaction—neutral or slightly alkaline in the upper  
 part and slightly alkaline or moderately alkaline  
 in the lower part

**Satanta Series**

The Satanta series consists of very deep, well drained, moderately permeable soils that formed in loamy eolian material or loamy alluvium that has been partially reworked by wind. These soils are on uplands, plains, or high stream terraces. Slopes range from 0 to 15 percent. Mean annual temperature is 55 degrees F, and mean annual precipitation is 18 inches.

**Typical Pedon**

Satanta loam, in a cultivated field:

- A—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly plastic and slightly sticky; many wormcasts in the lower part; neutral; gradual smooth boundary.
- BA—9 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, slightly plastic and slightly sticky; few wormcasts; neutral; clear smooth boundary.

Bt—13 to 23 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, plastic and sticky; thin discontinuous clay films on faces of some peds; few wormcasts; slightly alkaline; gradual smooth boundary.

Bk—23 to 34 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly plastic and slightly sticky; few or common threads and films of segregated lime; strong effervescence; moderately alkaline; gradual smooth boundary.

C—34 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly plastic; porous; strong effervescence; moderately alkaline.

**Type Location**

Haskell County, Kansas; 14 miles north of Tice; 800 feet south and 100 feet east of the northwest corner of sec. 9, T. 27 S., R. 31 W.

**Range in Characteristics**

*Thickness of the mollic epipedon:* 8 to 20 inches

*Depth to free carbonates:* 12 to 36 inches

*Calcium carbonate equivalent:* Less than 15 percent in the series control section

*Content of gravel:* 0 to 10 percent, by volume, throughout the profile

*Phases recognized:* Sandy substratum, gravelly substratum, dry, and elevation greater than 4,000 feet

*Other features:* Some pedons have a B<sub>ck</sub> horizon. This horizon has few carbonates occurring as seams, threads, or concretions.

*A horizon:*

Value—4 or 5 (2 or 3 moist)  
 Chroma—2 or 3  
 Texture—loam, very fine sandy loam, clay loam,  
 or fine sandy loam  
 Reaction—slightly acid to slightly alkaline

*Bt horizon:*

Hue—7.5YR, 10YR, or 2.5Y  
 Value—4 to 6 (3 to 5 moist)  
 Chroma—2 to 4  
 Texture—loam, sandy clay loam, or clay loam with  
 15 to 35 percent fine and coarser sand and less  
 than 50 percent sand  
 Reaction—neutral or slightly alkaline

*Bk horizon:*

Colors and textures—similar to those of the Bt horizon  
Reaction—slightly alkaline or moderately alkaline

*C or BCk horizon:*

Hue—10YR or 2.5Y  
Value—5 to 7 (4 to 6 moist)  
Chroma—2 to 4  
Texture—loam, silt loam, clay loam, sandy clay loam, very fine sandy loam, loamy fine sand, or fine sandy loam  
Reaction—slightly alkaline or moderately alkaline

**Scoville Series**

The Scoville series consists of deep, somewhat excessively drained soils that formed in wind-worked sandy alluvium over loamy alluvium. These soils are on stream terraces. Permeability is rapid in the upper part and moderate in the lower part. Slopes range from 0 to 3 percent. Mean annual air temperature is about 48 degrees F, and mean annual precipitation is about 15 inches at the type location.

**Typical Pedon**

Scoville fine sand, on a slope of 1 percent, in a cultivated field:

- Ap—0 to 8 inches; brown (10YR 5/3) fine sand, dark grayish brown (10YR 4/2) moist; weak fine granular structure; loose; slightly alkaline; abrupt smooth boundary.
- AC—8 to 15 inches; yellowish brown (10YR 5/4) loamy fine sand, dark brown (10YR 4/3) moist; single grain; loose; slightly alkaline; gradual wavy boundary.
- C1—15 to 49 inches; light yellowish brown (10YR 6/4) loamy fine sand, brown (10YR 5/3) moist; single grain; loose; slightly alkaline; abrupt wavy boundary.
- 2C2—49 to 60 inches; light gray (10YR 7/2) very fine sandy loam, brown (10YR 5/3) moist; weak coarse prismatic structure; soft, very friable; violent effervescence; few fine accumulations of carbonates; moderately alkaline.

**Type Location**

Sioux County, Nebraska; about 2 miles north of Morrill; 1,700 feet west and 150 feet north of the southeast corner of sec. 33, T. 24 N., R. 57 W.

**Range in Characteristics**

*Depth to the 2C horizon and carbonates:* Typically 40 to 55 inches; may be less than 40 inches in some pedons

*Other features:* A calcareous phase is recognized.

Reaction in this phase is slightly alkaline or moderately alkaline throughout the series control section, and the depth to carbonates ranges from 0 to 10 inches.

*A horizon:*

Hue—10YR  
Value—4 to 6 (3 to 5 moist)  
Chroma—2 or 3  
Note—horizons having value of less than 5.5 dry and 3.5 moist are less than 10 inches thick.  
Texture—sand, fine sand, loamy sand, or loamy fine sand  
Reaction—slightly acid to slightly alkaline

*AC horizon (if it occurs):*

Colors and textures—intermediate between those of the A and C horizons

*C horizon:*

Hue—10YR  
Value—5 or 6 (4 to 6 moist)  
Chroma—2 to 4  
Texture—sand, fine sand, loamy sand, or loamy fine sand  
Reaction—neutral or slightly alkaline

*2C horizon:*

Hue—10YR  
Value—6 to 8 (5 to 7 moist)  
Chroma—2 to 4  
Texture—very fine sandy loam, fine sandy loam, or loam with less than 18 percent clay  
Reaction—slightly alkaline or moderately alkaline  
Other features—strata of sand to loamy fine sand in the lower part of the series control section in some places; dark buried layers at a depth of more than 40 inches in some pedons

**Sidney Series**

The Sidney series consists of well drained, moderately permeable soils on upland hillslopes. These soils formed in loamy, calcareous residuum derived from weakly cemented, fine grained sandstone and are deep over weakly cemented, calcareous, fine grained sandstone. Slopes range from 3 to 20 percent. Mean annual precipitation is about 17 inches, and mean annual air temperature is about 51 degrees F at the type location.

**Typical Pedon**

Sidney loam, in an area of Sidney-Canyon loams, 3 to 9 percent slopes, on a convex, east-facing side slope of 5 percent, in a cultivated field:

- Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; common very fine and few fine roots; strong effervescence; 2 percent calcareous sandstone gravel, by volume; slightly alkaline; abrupt smooth boundary.
- Bw—7 to 16 inches; brown (10YR 5/3) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable; common very fine and fine roots; strong effervescence; 2 percent calcareous sandstone gravel, by volume; moderately alkaline; gradual smooth boundary.
- Bk—16 to 26 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable; common fine roots; violent effervescence; 2 percent calcareous sandstone gravel, by volume; many mycelia-like threads and seams of calcium carbonate; moderately alkaline; clear wavy boundary.
- C—26 to 48 inches; very pale brown (10YR 7/3) very fine sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable; few fine roots; strong effervescence; 5 percent calcareous sandstone gravel, by volume; moderately alkaline; clear wavy boundary.
- Cr—48 to 80 inches; very pale brown (10YR 8/2), weakly cemented, fine grained sandstone, light gray (10YR 7/2) moist; violent effervescence; moderately alkaline.

### Type Location

Banner County, Nebraska; about 7 miles south and 5 miles east of Harrisburg; 2,500 feet east and 1,700 feet north of the southwest corner of sec. 10, T. 17 N., R. 55 W.

### Range in Characteristics

*Mean annual soil temperature:* 49 to 55 degrees F  
*Depth to paralithic contact:* 40 to 60 inches  
*Depth to secondary calcium carbonate:* 0 to 18 inches; typically 0 to 10 inches  
*Thickness of the mollic epipedon:* 7 to 20 inches  
*Thickness of the solum:* 7 to 30 inches  
*Content of clay in the particle-size control section (weighted average):* 5 to 20 percent  
*Texture of the control section:* Silt loam, loam, very fine sandy loam, or fine sandy loam that generally averages less than 65 percent total sand and about 35 percent or less very fine sand

*Content of rock fragments:* The content of calcareous sandstone is typically less than 5 percent, by volume, but ranges from 0 to 15 percent. Some pedons contain volcanic ash with glass shards that make up 20 to 80 percent, by volume, of the very fine sand and coarse silt. In some pedons a few granitic pebbles are throughout the profile.

*Other features:* Some pedons have an AC horizon. This horizon has colors and textures intermediate between those of the A and C horizons.

#### A horizon:

Hue—10YR  
 Value—4 or 5 (2 or 3 moist)  
 Chroma—2 or 3  
 Texture—loam, very fine sandy loam, or fine sandy loam  
 Reaction—typically slightly alkaline or moderately alkaline; neutral or slightly alkaline in pedons that are leached of carbonates

#### Bw horizon:

Hue—10YR  
 Value—4 to 6 (3 to 5 moist)  
 Chroma—2 or 3  
 Texture—silt loam, loam, very fine sandy loam, or fine sandy loam  
 Calcium carbonate equivalent—1 to 10 percent  
 Reaction—slightly alkaline or moderately alkaline

#### Bk horizon:

Hue—10YR  
 Value—5 to 8 (4 to 7 moist)  
 Chroma—1 to 3  
 Texture—silt loam, loam, very fine sandy loam, or fine sandy loam  
 Calcium carbonate equivalent—5 to 25 percent  
 Reaction—slightly alkaline or moderately alkaline

#### C horizon:

Hue—10YR  
 Value—7.5YR or 10YR  
 Chroma—1 to 3  
 Texture—loam, very fine sandy loam, fine sandy loam, or sandy loam  
 Calcium carbonate equivalent—1 to 15 percent  
 Reaction—slightly alkaline to strongly alkaline

#### Cr horizon:

Hue—7.5YR or 10YR  
 Value—6 to 8 (5 to 7 moist)  
 Chroma—1 to 4

## Sulco Series

The Sulco series consists of very deep, well drained soils that formed in loess on uplands and tablelands. Permeability is moderate. Slopes range from 3 to 60 percent. Mean annual precipitation is about 18 inches, and mean annual air temperature is about 50 degrees F.

### Typical Pedon

Sulco loam, on a convex, east-facing slope of 14 percent, in an area of native grass. When described, the soil was dry throughout.

- A—0 to 3 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; slightly hard, friable; slightly alkaline; clear smooth boundary.
- Bw—3 to 6 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; strongly effervescent; 3 percent calcium carbonate equivalent; moderately alkaline; clear smooth boundary.
- Bk1—6 to 16 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; many fine and medium soft accumulations of carbonate; violently effervescent; 13 percent calcium carbonate equivalent; moderately alkaline; diffuse wavy boundary.
- Bk2—16 to 27 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; many fine and medium soft accumulations of carbonate; violently effervescent; 12 percent calcium carbonate equivalent; strongly alkaline; clear smooth boundary.
- C1—27 to 40 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; soft, very friable; strongly effervescent; 8 percent calcium carbonate equivalent; strongly alkaline; diffuse wavy boundary.
- C2—40 to 50 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable; strongly effervescent; 7 percent calcium carbonate equivalent; strongly alkaline; diffuse wavy boundary.
- C3—50 to 80 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; soft, very friable; strongly effervescent; 6 percent calcium carbonate equivalent; strongly alkaline.

## Type Location

Dundy County, Nebraska; about 15 miles north of Benkelman; 1,800 feet east and 500 feet north of the southwest corner of sec. 29, T. 4 N., R. 37 W.; USGS Ough topographic quadrangle; lat. 40 degrees 18 minutes 55 seconds north and long. 101 degrees 34 minutes 16 seconds west.

### Range in Characteristics

*Control section:* 8 to 17 percent clay, 30 to 55 percent silt, 30 to 60 percent sand; 85 percent or more of the total sand consists of very fine sand; particle-size distribution is relatively uniform throughout

*Depth to carbonates:* 0 to 6 inches

*Carbonate equivalent in the series control section:* 5 to 15 percent; most carbonates occur as accumulations

*Other features:* These soils typically have a Bw horizon that is too thin to qualify for a cambic horizon. Some pedons have an AC horizon that ranges up to 15 inches in thickness. Some pedons in cultivated areas do not have an AC or Bw horizon.

#### A horizon:

Hue—10YR

Value—4 to 6 (3 to 5 moist)

Chroma—2 or 3

Reaction—slightly alkaline or moderately alkaline

Texture—silt loam, loam, very fine sandy loam, or fine sandy loam

#### Bw horizon:

Hue—10YR or 2.5Y

Value—5 to 7 (4 to 6 moist)

Chroma—2 or 3

Reaction—slightly alkaline or moderately alkaline

Texture—silt loam, loam, or very fine sandy loam

#### Bk horizon (if it occurs):

Hue—10YR or 2.5Y

Value—5 to 7 (4 to 6 moist)

Chroma—2 or 3

Accumulations of carbonates—few or common

Reaction—moderately alkaline or strongly alkaline

Texture—silt loam, loam, or very fine sandy loam

#### C horizon:

Hue—10YR or 2.5Y

Value—5 to 7 (4 to 6 moist)

Chroma—2 to 4

Reaction—moderately alkaline or strongly alkaline

Texture—silt loam, loam, or very fine sandy loam

## ***Tassel Series***

The Tassel series consists of shallow, well drained soils that formed in residuum derived from sandstone. These soils are on uplands. Permeability is moderately rapid. Slopes range from 0 to 70 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is about 48 degrees F at the type location.

### **Typical Pedon**

Tassel fine sandy loam, on a slope of 15 percent, in an area of rangeland:

- A—0 to 8 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; soft, very friable; 3 percent sandstone gravel, by volume; strong effervescence; slightly alkaline; gradual smooth boundary.
- C—8 to 15 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable; 10 percent sandstone gravel and cobbles, by volume; violent effervescence; moderately alkaline; gradual smooth boundary.
- Cr—15 to 80 inches; light gray (10YR 7/2), partially consolidated, soft sandstone; violent effervescence.

### **Type Location**

Scotts Bluff County, Nebraska; about 4 miles south and 9 miles west of Gering; 1,850 feet west and 2,110 feet north of the southeast corner of sec. 29, T. 21 N., R. 56 W.

### **Range in Characteristics**

*Depth to free carbonates:* 0 to 3 inches

*Texture of the particle-size control section:* Typically 5 to 12 percent clay and 52 to 75 percent sand

*Depth to the Cr horizon:* Typically 10 to 20 inches; ranges from 6 to 20 inches

*Reaction:* Slightly alkaline or moderately alkaline throughout the profile

*Other features:* Where the A horizon has mollic colors, it lacks sufficient thickness to qualify for a mollic epipedon. Some pedons have an AC horizon that has colors and textures intermediate between those of the A and C horizons.

*A horizon:*

Hue—10YR or 2.5Y

Value—4 to 7 (3 to 6 moist)

Chroma—2 to 4

Texture—fine sandy loam, very fine sandy loam,

loamy very fine sand, sandy loam, loamy sand, or loamy fine sand

*C horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—5 to 8 (4 to 7 moist)

Chroma—2 or 3

Texture—fine sandy loam, very fine sandy loam with less than 12 percent clay, sandy loam, loamy very fine sand, or loamy fine sand

## ***Valent Series***

The Valent series consists of very deep, excessively drained soils that formed in mixed eolian material. These soils are in areas of nearly level or dunelike topography. Slopes range from 0 to 60 percent. The mean annual precipitation is about 16 inches, and the mean annual air temperature is about 50 degrees F.

### **Typical Pedon**

Valent sand, in an area of grassland:

- A—0 to 4 inches; grayish brown (10YR 5/2) sand, dark grayish brown (10YR 4/2) moist; single grain; loose; neutral (pH 7.2); gradual smooth boundary.
- C—4 to 60 inches; pale brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grain; loose; neutral (pH 7.2).

### **Type Location**

Washington County, Colorado; 805 feet east and 1,900 feet south of the northwest corner of sec. 5, T. 1 S., R. 49 W.

### **Range in Characteristics**

Mean annual soil temperature ranges from 47 to 58 degrees F, and mean summer soil temperature ranges from 59 to 78 degrees F. Depth to calcareous material is 40 to more than 60 inches. The content of organic carbon ranges from 0.3 to 1.5 percent in the surface horizon and decreases uniformly with increasing depth. The control section is uniform fine sand or loamy sand but ranges from 0 to 15 percent clay, 0 to 30 percent silt, and 70 to 100 percent sand. The content of rock fragments is typically less than 2 percent; the rock fragments are limited mainly to scattered pebbles. Some pedons have a weak AC horizon.

*A or AC horizon:*

Hue—2.5Y to 7.5YR

Value—4 to 6 (3 to 5 moist)

Chroma—2 to 4

Texture—sand, loamy sand, loamy fine sand, or fine sand

Reaction—neutral or slightly alkaline

Content of organic carbon—less than 0.6 percent

*C horizon:*

Hue—2.5Y to 7.5YR

Value—5 to 7 (4 or 5 moist)

Chroma—2 to 4

Reaction—neutral or slightly alkaline

Texture—loamy fine sand, fine sand, sand, or loamy sand

Table 5.--Classification of the Soils

Soil name	Family or higher taxonomic class
Alice-----	Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls
Alliance-----	Fine-silty, mixed, superactive, mesic Aridic Argiustolls
Altvan-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aridic Argiustolls
Ascalon-----	Fine-loamy, mixed, superactive, mesic Aridic Argiustolls
Ashollow-----	Coarse-loamy, mixed (calcareous), superactive, mesic Aridic Ustorthents
Bluebridge-----	Mixed, mesic Aridic Ustipsamments
Broadwater-----	Sandy, mixed, mesic Aridic Ustifluvents
Calamus-----	Mixed, mesic Oxyaquic Ustipsamments
Canyon-----	Loamy, mixed (calcareous), superactive, mesic, shallow Ustic Torriorthents
Chappell-----	Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls
Duroc-----	Fine-silty, mixed, superactive, mesic Pachic Haplustolls
Eckley-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aridic Argiustolls
Glenberg-----	Coarse-loamy, mixed (calcareous), superactive, mesic Ustic Torrifluvents
Gothenburg-----	Mixed, mesic Typic Psammaquents
Jankosh-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aquic Natrustolls
Jayem-----	Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls
Johnstown-----	Fine-silty, mixed, superactive, mesic Pachic Argiustolls
Keith-----	Fine-silty, mixed, superactive, mesic Aridic Argiustolls
Kuma-----	Fine-silty, mixed, superactive, mesic Pachic Argiustolls
Las Animas-----	Coarse-loamy, mixed (calcareous), superactive, mesic Typic Fluvaquents
Lexsworth-----	Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls
Lodgepole-----	Fine, smectitic, mesic Vertic Argiaquolls
McConaughy-----	Coarse-silty, mixed, superactive, mesic Aridic Haplustolls
Merrick-----	Fine-loamy, mixed, superactive, mesic Cumulic Haplustolls
Platte-----	Sandy, mixed, mesic Aeric Fluvaquents
Ralton-----	Coarse-silty, mixed, superactive, mesic Fluventic Haplustolls
Richfield-----	Fine, smectitic, mesic Aridic Argiustolls
Rosebud-----	Fine-loamy, mixed, superactive, mesic Calcic Argiustolls
Sarben-----	Coarse-loamy, mixed, superactive, nonacid, mesic Aridic Ustorthents
Satanta-----	Fine-loamy, mixed, superactive, mesic Aridic Argiustolls
Scoville-----	Mixed, mesic Aridic Ustipsamments
Sidney-----	Coarse-loamy, mixed, superactive, mesic Aridic Calciustolls
Sulco-----	Coarse-silty, mixed (calcareous), superactive, mesic Aridic Ustorthents
Tassel-----	Loamy, mixed (calcareous), superactive, mesic, shallow Ustic Torriorthents
Valent-----	Mixed, mesic Ustic Torripsamments



# Formation of the Soils

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This section describes how the factors of soil formation have affected the soils in Deuel County.

Soil forms through processes acting on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material.

Climate and plant and animal life, mainly plants, are the active factors of soil formation. They act on parent material and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material also influences the kind of soil profile that forms and, in extreme cases, determines it almost entirely.

Finally, time is needed to change the parent material into a soil profile. A long time is normally required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four.

## Parent Material

Parent material is the unconsolidated material in which a soil forms. It determines the mineralogical and chemical composition of the soil. The soils in Deuel County formed in parent material that was transported by wind or water or moved by gravity or that weathered from underlying geologic formations.

Loess is wind-deposited silty material that mantles the tablelands and some dissected uplands in Deuel County. It is yellowish brown, calcareous material ranging from a few feet to 50 feet in thickness. Keith, Kuma, Alliance, Johnstown, Richfield, Sulco, and Satanta soils are the major soils that formed in loess.

Alluvium is material deposited by water on flood plains and stream terraces in broad river valleys or in narrow upland drainageways. It has a wide range in

texture because of differences in the material from which it was derived and in the manner in which it was deposited. Duroc soils formed in alluvium on stream terraces. Scoville soils formed in wind-worked alluvium on stream terraces. Gothenburg, Las Animas, Lexsworth, Merrick, Platte, Broadwater, and Ralton soils formed in alluvium on flood plains.

Colluvium is material that accumulated as a result of the combined forces of gravity and water. In Deuel County, colluvial material occurs on footslopes of dissected uplands. Ashollow soils formed in colluvium.

The Ogallala Sandstone Formation extends throughout much of the northwestern part of the county. In some places it is at the surface, and in other places it is only a few feet below the surface. It is composed of beds of silty to gravelly material that ranges from soft or loose to very hard. The rock that formed in this material ranges from friable or loose and only partly indurated to relatively hard, resistant, ledge-forming mortar beds. Canyon, Rosebud, and Sidney soils formed in parent material weathered from the Ogallala Formation.

## Climate

Climate has had an important effect on soil formation in Deuel County. It affects soils directly through its influence on the parent material and indirectly through its influence on vegetation and micro-organisms.

The climatic factors that affect the weathering of parent material are rainfall, fluctuating temperatures, and wind. The climate of Deuel County is characterized by cold winters and hot summers. Rainfall is heaviest in late spring and early summer. The annual precipitation averages about 17 inches. Because the amount of rainfall is relatively low, the soils generally are not leached to a significant depth. Runoff of rainwater removes, relocates, and sorts soil material. The wind also removes, sorts, and redeposits soil material. The deposits of eolian sands in the county are examples of the importance of wind as an agent of deposition. Drying promotes the development of granular structure in the surface layer, which is common in the soils of Deuel County.

Alternating periods of freezing and thawing hasten the physical disintegration of the parent material and enhance the development of soil structure.

Micro-organisms in the soil are most active within a certain range in temperature. Thus, the rate at which organic material is decomposed into humus varies, depending on the climatic conditions. Changes in temperature and moisture activate the weathering of parent material, which results in chemical and physical changes in the soil.

Because the humidity in Deuel County is generally low, a fairly high amount of water is lost through evaporation and transpiration. This loss reduces the amount of water available for leaching, plant growth, decomposition of organic material, and chemical weathering.

## **Plant and Animal Life**

Plants, burrowing animals, micro-organisms, earthworms, and other living organisms affect soil formation. The soils in Deuel County formed mainly under a mixture of short, mid, and tall grasses. Each year, the grasses formed new growth above the ground and their fibrous roots penetrated the upper few feet of the soil. In time, a dark layer developed at the surface. This layer gradually became thicker as more organic material decayed into humus. Because of the additional humus, the soils developed granular structure and good tilth. Plant roots bring nutrients to the surface. Calcium, in particular, helps to keep the soils porous. The decomposition of organic material forms organic acids that, in solution, hasten the leaching process. Soils that formed in sandy parent materials resistant to weathering and that have a low available water capacity, such as Valent soils, tend to develop more slowly than soils that provide a more favorable medium for plants and animals, such as Keith soils.

The activity of micro-organisms helps to change undecomposed organic material into humus. Some bacteria take in nitrogen from the air. When they die, the nitrogen becomes available to plants. Other bacteria oxidize sulfur, which then becomes available to plants. The plants, in turn, complete the cycle by producing more organic material. Other living organisms, such as algae, fungi, protozoa, and actinomycetes, affect soil formation physically and chemically. Larger animals, such as gophers and moles, earthworms, millipedes, spiders, and other insects help to mix the soil and add organic material when they die.

Human activities also affect soil formation. They

have an immediate effect on the rate and the direction of the changes caused by the soil-forming processes. Additions of fertilizer and irrigation water change the soil. Cultivation can result in soil loss unless erosion is controlled. Conservation tillage practices and terraces have beneficial effects on the soils.

## **Relief**

Relief affects soil formation mainly through its influence on runoff, erosion, aeration, and drainage. The rate of runoff is more rapid on steep and very steep soils than on the less sloping soils. Consequently, plant growth generally is less vigorous on the steeper soils, less water penetrates the surface, soil horizons are thinner and less distinct, and calcium carbonate is not so deeply leached. Also, the hazard of erosion is more severe on the steeper soils if all other factors are equal.

Relief can contribute to differences in the color, thickness, and horizonation of soils that formed in the same kind of parent material. For example, differences among Sulco, McConaughy, Keith, and Lodgepole soils, all of which formed in Peoria Loess, can be attributed mainly to differences in relief. The gradient, shape, length, and direction of the slopes influence the amount of moisture in the soil. The steep and very steep Sulco soils are weakly developed, have a thin surface layer, and have lime at or near the surface. In McConaughy soils, which are less steep than the Sulco soils, the surface layer is thicker, lime is leached to a greater depth, and a thin subsoil has formed. In the nearly level and gently sloping Keith soils, the surface layer is dark and thick, the subsoil is well developed, and lime is leached to a greater depth than is typical in the McConaughy soils. Lodgepole soils, which formed in depressions, are the most strongly developed soils in Deuel County.

The soils on flood plains, such as Gothenburg, Platte, and Broadwater soils, are characterized by low relief. They commonly receive new sediment during periods of flooding. Each flood provides new parent material and starts a new cycle of soil formation.

## **Time**

Time enables relief, climate, and plant and animal life to change the parent material into a soil. If the parent material has been in place for only a short time, the soils are weakly developed. The degree of profile development depends on the intensity of the soil-forming factors. Differences in the length of time that

geological material has been in place are commonly reflected in the distinctness of horizons in the soil profile.

The time needed for soil formation depends mainly on the kinds of parent material and the climate. The resistance to weathering of the parent material partly determines the length of time that is needed. Generally, soils in warm, humid areas form faster than soils in cool, dry areas.

Soil maturity is related not only to time but also to the other four soil-forming factors. Soils that do not have a B horizon are commonly considered immature, and soils that have a well developed B horizon are considered mature. The maturity of a soil, however, depends on the interaction of all five soil-forming factors. Thus, a very steep Sulco soil that does not have a B horizon might be as mature as it can be on its particular slope and under its particular climate.



# Use and Management of the Soils

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This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

## Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables

identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

## Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited*, *somewhat limited*, and *very limited*. In some tables, *slight*, *moderate*, and *severe* are used. The suitability ratings are expressed as *good*, *fair*, and *poor*.

## Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

## Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

## Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

*Capability classes*, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2*e*. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil

interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

*Capability units* are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2*e*-4 and 3*e*-6.

The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

## Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is

uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops (fig. 8). Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Table 7 is a relative rating of the capacity of a soil to produce a specific plant under a defined management system. The index in table 7 is determined from soil properties. It is used to rank the map units based on potential yield capability and can be used to estimate the net returns from crops, estimate land assessment

values, and perform risk analysis when land management decisions are made.

### Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are



Figure 8.—Winter wheat grown in a wheat-fallow rotation is the most common cropping system in the county. The major areas for winter wheat production are in areas of soils that formed in wind-deposited sediments on tablelands.

those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 8. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

## Rangeland

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 9 shows, for each soil that supports vegetation suitable for grazing, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in table 9 follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over

time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

*Total dry-weight production* is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

*Characteristic vegetation*—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *maximum rangeland composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community

relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the National Range and Pasture Handbook, which is available in local offices of the Natural Resources Conservation Service.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

## Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 10 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 10 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

## Recreation

Prepared by Alan J. Stuebe, soil scientist, Natural Resources Conservation Service.

Deuel County offers a wide variety of recreational activities for all types of people. The county provides

many types of outdoor opportunities, such as hunting, fishing, hiking, camping, and picnicking. Sightseeing and photography can also be particularly enjoyable at the many natural, scenic, and historical sites in Deuel County and nearby areas.

Hunting is very popular in Deuel County. Regular hunting seasons include ring-necked pheasant, sharp-tailed grouse, rabbit, squirrel, raccoon, and coyote. Mourning doves are also common throughout the county and provide early hunting opportunities in the fall season. White-tailed deer, mule deer, and antelope are plentiful.

Chappell, the county seat, offers additional recreational activities. A nine-hole golf course is south of Chappell. The community also has playgrounds, a museum, and a swimming pool. The Pony Express Recreational Area provides additional opportunities, ranging from fishing to picnicking.

Many interesting places near Deuel County offer recreational opportunities. The Ash Hollow Historical Park, just northeast of Chappell, commemorates the important role of the area in the settlement of the West. Included in the park are remnants of the famous Oregon Trail, where covered wagons once traveled. Lake McConaughy also is nearby. This lake is approximately 35,000 surface acres in size and is Nebraska's largest reservoir. Water-skiing, boating, fishing, picnicking, camping, and swimming are available.

Deuel County is a beautiful and unique area of Nebraska. From flat fertile farmlands to rugged breaks, the county is characterized by a wide variety of natural features that enhance recreational opportunities. Additional information may be obtained through the Nebraska State Historical Society and the town of Chappell.

The soils of the survey area are rated in tables 11a and 11b according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation

procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in the tables can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

*Camp areas* require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas.

The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Picnic areas* are subject to heavy foot traffic. Most

vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Playgrounds* require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Paths and trails* for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

*Off-road motorcycle trails* require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water

capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

## Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

*Grain and seed crops* are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and

soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

*Grasses and legumes* are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

*Wild herbaceous plants* are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

*Hardwood trees* and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

*Coniferous plants* furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

*Shrubs* are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are bitterbrush, mountainmahogany, snowberry, and big sagebrush.

*Wetland plants* are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are

created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

*Habitat for rangeland wildlife* consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, agricultural waste management, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel*

*experienced in the design and construction of engineering works.*

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; evaluate sites for agricultural waste management; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

## Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 13a and 13b show the degree and kind of soil limitations that

affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Dwellings* are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Small commercial buildings* are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of

spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect

plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

### Sanitary Facilities

Tables 14a and 14b show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet

below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

*A trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or

highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a

cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

### **Agricultural Waste Management**

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Tables 15a and 15b show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Application of manure and food-processing waste* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption

ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

*Application of sewage sludge* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

*Disposal of wastewater by irrigation* not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and

performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

*Overland flow of wastewater* is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

*Rapid infiltration of wastewater* is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to

bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

### Construction Materials

Tables 16a and 16b give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

*Gravel* and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 16a, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good*, *fair*, or *poor* as potential sources of gravel and sand. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good*, *fair*, or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that

affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

*Reclamation material* is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

*Roadfill* is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

## Water Management

Table 17 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

*Aquifer-fed excavated ponds* are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds

that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

*Drainage* is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, a cemented pan, or other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

*Irrigation* is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for

drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*Grassed waterways* are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Table 6.--Land Capability and Yields per Acre of Crops

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Winter wheat-fallow	
	N	I	N	I	N	I	N	I
			Tons		Bu		Bu	
1130: Alliance-----	2c	1-4	---	5.8	---	145	42	---
1146: Alliance-----	2e	2e-4	---	5.5	---	140	40	---
Rosebud-----	3e	3e-7	---	4.7	---	130	36	---
1198: Altvan-----	4e	4e-7	---	3.5	---	125	30	---
Eckley-----	6e	---	---	2.5	---	95	17	---
Satanta-----	4e	4e-4	---	4.5	---	135	32	---
1295: Ashollow-----	6e	---	---	---	---	---	---	---
Tassel-----	6s	---	---	---	---	---	---	---
1588: Blueridge-----	6s	---	---	---	---	---	---	---
Altvan-----	6e	---	---	---	---	---	---	---
1782: Broadwater-----	6w	---	---	---	---	---	---	---
1944: Calamus-----	6s	4s-14	---	3.8	---	100	26	---
2072: Chappell-----	3e	2e-9	---	4.5	---	130	30	---
Alice-----	3e	2e-8	5.0	5.0	---	135	35	---
Broadwater-----	6w	---	2.5	---	---	75	18	---
2630: Duroc-----	2c	1-6	---	6.0	---	155	46	---
2638: Duroc-----	2c	1-6	---	6.0	---	155	46	---
2639: Duroc-----	2e	2e-6	---	5.5	---	150	45	---
3050: Glenberg-----	3e	2e-8	---	4.5	---	130	30	---
3140: Gothenburg-----	7s	---	---	---	---	---	---	---

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Winter wheat- fallow	
	N	I	N	I	N	I	N	I
			Tons		Bu		Bu	
3952: Jankosh-----	6s	4s-6	---	2.5	---	80	20	---
4028: Jayem-----	3e	2e-8	---	4.8	---	130	42	---
4070: Johnstown-----	2c	1-4	---	5.6	---	145	43	---
Satanta-----	2c	1-4	---	5.6	---	145	40	---
Richfield-----	2c	1-4	---	5.0	---	135	38	---
4151: Keith-----	2e	2e-4	---	5.6	---	140	42	---
4152: Keith-----	3e	3e-4	---	5.0	---	135	32	---
4310: Kuma-----	2c	1-4	---	6.0	---	155	46	---
4311: Kuma-----	2e	2e-4	---	5.8	---	150	42	---
4472: Las Animas-----	5w	---	---	---	---	---	---	---
4475: Las Animas-----	2w	2w-8	---	5.5	---	125	35	---
4592: Lexsworth-----	3w	3w-7	---	5.0	---	140	35	---
4655: Lodgepole-----	3w	4w-2	3.0	---	---	90	35	---
5212: Merrick-----	2c	1-6	---	6.0	---	150	44	---
6132: Platte-----	6w	4w-13	---	3.6	---	80	30	---
6248: Ralton-----	2c	1-6	---	5.6	---	150	42	---
6625: Sarben-----	4e	3e-10	---	3.8	---	115	28	---
6626: Sarben-----	4e	4e-10	---	3.8	---	110	26	---
6722: Satanta-----	3e	3e-4	---	4.5	---	135	32	---
Altvan-----	4e	4e-7	---	4.0	---	110	28	---
6725: Satanta-----	3e	2e-5	---	5.4	---	140	38	---
Ascalon-----	3e	2e-5	---	5.0	---	135	35	---

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Winter wheat- fallow	
	N	I	N	I	N	I	N	I
			Tons		Bu		Bu	
6727:								
Satanta-----	2e	2e-4	---	5.6	---	145	40	---
Johnstown-----	2e	2e-4	---	6.0	---	145	41	---
Altvan-----	3e	2s-7	---	4.2	---	125	34	---
6817:								
Scoville-----	4e	4e-11	---	3.6	---	110	22	---
6930:								
Sidney-----	3e	3e-6	---	4.6	---	125	30	---
6937:								
Sidney-----	4e	4e-6	---	3.2	---	100	25	---
Canyon-----	6s	---	---	1.5	---	50	10	---
7120:								
Sulco-----	4e	3e-6	---	4.4	---	115	28	---
McConaughy-----	4e	3e-6	---	4.8	---	125	30	---
7121:								
Sulco-----	4e	4e-6	---	3.5	---	110	28	---
McConaughy-----	4e	4e-6	---	3.8	---	115	28	---
7122:								
Sulco-----	6e	---	---	---	---	---	---	---
McConaughy-----	6e	---	---	---	---	---	---	---
7582:								
Valent-----	6e	4e-12	---	3.0	---	105	20	---
7586:								
Valent-----	6e	---	---	---	---	---	---	---
7588:								
Valent, rolling--	6e	---	---	---	---	---	---	---
Valent, hilly---	7e	---	---	---	---	---	---	---

Table 7.--General Crop Production Index

(The General Crop Production Index (GCPI) is a relative rating of the capacity of a soil to produce a specific plant under a defined management system. The index is determined from yield data on a few benchmark soils and is used to calculate yields, the net returns from crops, and land assessment values and to perform risk analysis when land management decisions are made.)

Map symbol	Soil name	Crop index
1130	Alliance loam, 0 to 1 percent slopes-----	56
1146	Alliance-Rosebud loams, 1 to 3 percent slopes-----	46
1198	Altvan-Eckley-Satanta complex, 3 to 9 percent slopes-----	38
1295	Ashollow-Tassel complex, 9 to 30 percent slopes-----	26
1588	Blueridge-Altvan complex, 6 to 30 percent slopes-----	23
1782	Broadwater loamy sand, 0 to 1 percent slopes, frequently flooded-----	17
1944	Calamus sand, 0 to 1 percent slopes, very rarely flooded-----	23
2072	Chappell-Alice-Broadwater complex, 0 to 3 percent slopes-----	36
2630	Duroc loam, 0 to 1 percent slopes-----	60
2638	Duroc loam, terrace, 0 to 1 percent slopes-----	59
2639	Duroc loam, terrace, 1 to 3 percent slopes-----	58
3050	Glenberg fine sandy loam, 0 to 1 percent slopes, rarely flooded-----	35
3140	Gothenburg soils, 0 to 1 percent slopes, occasionally flooded-----	17
3952	Jankosh loam, 0 to 1 percent slopes, rarely flooded-----	26
4028	Jayem fine sandy loam, 0 to 2 percent slopes-----	50
4070	Johnstown-Satanta-Richfield loams, 0 to 1 percent slopes-----	60
4151	Keith loam, 1 to 3 percent slopes-----	61
4152	Keith loam, 3 to 6 percent slopes-----	58
4310	Kuma loam, 0 to 1 percent slopes-----	60
4311	Kuma loam, 1 to 3 percent slopes-----	61
4472	Las Animas loam, 0 to 1 percent slopes, channeled, frequently flooded----	31
4475	Las Animas loam, 0 to 1 percent slopes, occasionally flooded-----	39
4592	Lexsworth loam, 0 to 1 percent slopes, very rarely flooded-----	31
4655	Lodgepole silt loam, ponded-----	10
5212	Merrick sandy clay loam, 0 to 1 percent slopes, very rarely flooded-----	58
6132	Platte loam, 0 to 1 percent slopes, occasionally flooded-----	27
6248	Ralton loam, 0 to 1 percent slopes, very rarely flooded-----	49
6625	Sarben loamy fine sand, 0 to 3 percent slopes-----	34
6626	Sarben loamy fine sand, 3 to 6 percent slopes-----	33
6722	Satanta-Altvan complex, 3 to 6 percent slopes-----	51
6725	Satanta-Ascalon complex, 0 to 2 percent slopes-----	57
6727	Satanta-Johnstown-Altvan loams, 1 to 3 percent slopes-----	57
6817	Scoville loamy fine sand, 0 to 3 percent slopes-----	31
6930	Sidney loam, 3 to 6 percent slopes-----	51
6937	Sidney-Canyon loams, 3 to 9 percent slopes-----	39
7120	Sulco-McConaughy loams, 3 to 6 percent slopes, moderately eroded-----	52
7121	Sulco-McConaughy loams, 6 to 9 percent slopes, moderately eroded-----	48
7122	Sulco-McConaughy loams, 9 to 20 percent slopes, moderately eroded-----	41
7582	Valent fine sand, 3 to 9 percent slopes-----	19
7586	Valent fine sand, rolling-----	14
7588	Valent complex, rolling and hilly-----	8

Table 8.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Map unit name
1130	Alliance loam, 0 to 1 percent slopes (if irrigated)
1146	Alliance-Rosebud loam, 1 to 3 percent slopes (if irrigated)
2072	Chappell-Alice-Broadwater complex, 0 to 3 percent slopes (if irrigated)
2630	Duroc loam, 0 to 1 percent slopes (if irrigated)
2638	Duroc loam, terrace, 0 to 1 percent slopes (if irrigated)
2639	Duroc loam, terrace, 1 to 3 percent slopes (if irrigated)
3050	Glenberg fine sandy loam, 0 to 1 percent slopes, rarely flooded (if irrigated)
4028	Jayem fine sandy loam, 0 to 2 percent slopes (if irrigated)
4070	Johnstown-Satanta-Richfield loams, 0 to 1 percent slopes (if irrigated)
4151	Keith loam, 1 to 3 percent slopes (if irrigated)
4152	Keith loam, 3 to 6 percent slopes (if irrigated)
4310	Kuma loam, 0 to 1 percent slopes (if irrigated)
4311	Kuma loam, 1 to 3 percent slopes (if irrigated)
4475	Las Animas loam, 0 to 1 percent slopes, occasionally flooded (if irrigated and drained)
4592	Lexsworth loam, 0 to 1 percent slopes, very rarely flooded (if irrigated)
5212	Merrick sandy clay loam, 0 to 1 percent slopes, very rarely flooded (if irrigated)
6248	Ralton loam, 0 to 1 percent slopes, very rarely flooded (if irrigated)
6722	Satanta-Altvan complex, 3 to 6 percent slopes (if irrigated)
6725	Satanta-Ascalon complex, 0 to 2 percent slopes (if irrigated)
6727	Satanta-Johnstown-Altvan loams, 1 to 3 percent slopes (if irrigated)
6930	Sidney loam, 3 to 6 percent slopes (if irrigated)
7120	Sulco-McConaughy loams, 3 to 6 percent slopes, moderately eroded (if irrigated)

Table 9.--Rangeland Productivity and Characteristic Plant Communities

(Only the soils that support rangeland vegetation suitable for grazing are listed.)

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
1130: Alliance-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Western wheatgrass-----	20
					Blue grama-----	15
					Needleandthread-----	15
					Little bluestem-----	10
					Big bluestem-----	5
					Buffalograss-----	5
					Green needlegrass-----	5
					Sedge-----	5
					Perennial forbs-----	5
					Perennial grasses-----	15
1146: Alliance-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Western wheatgrass-----	20
					Blue grama-----	15
					Needleandthread-----	15
					Little bluestem-----	10
					Big bluestem-----	5
					Buffalograss-----	5
					Green needlegrass-----	5
					Sedge-----	5
					Perennial forbs-----	5
					Perennial grasses-----	15
Rosebud-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Big bluestem-----	5
					Little bluestem-----	10
					Sideoats grama-----	10
					Threadleaf sedge-----	5
					Needleandthread-----	15
					Blue grama-----	15
					Buffalograss-----	5
					Green needlegrass-----	10
					Perennial grasses-----	5
					Perennial forbs-----	5
					Western wheatgrass-----	15
1198: Altvan-----	Silty; Veg. Zone 2	2,100	1,700	1,300	Little bluestem-----	10
					Blue grama-----	20
					Buffalograss-----	5
					Threadleaf sedge-----	5
					Western wheatgrass-----	25
					Needleandthread-----	20
					Perennial grasses-----	10
					Perennial forbs-----	5
Eckley-----	Shallow to Gravel; Veg. Zone 2	1,400	1,200	800	Blue grama-----	25
					Needleandthread-----	10
					Sideoats grama-----	5
					Little bluestem-----	5
					Sedge-----	5
					Prairie sandreed-----	10
					Western wheatgrass-----	20
					Thickspike wheatgrass-----	10
					Green needlegrass-----	10

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
1198: Satanta-----	Silty; Veg. Zone 2	3,200	2,500	1,800	Big bluestem----- Little bluestem----- Needleandthread----- Blue grama----- Sideoats grama----- Western wheatgrass----- Perennial grasses-----	15 15 15 20 10 20 5
1295: Ashollow-----	Sandy; Veg. Zone 2	2,300	1,600	1,200	Blue grama----- Little bluestem----- Needleandthread----- Prairie sandreed----- Sand bluestem----- Sedge----- Perennial grasses----- Perennial forbs-----	20 10 15 25 10 10 5 5
Tassel-----	Shallow Limy; Veg. Zone 2	1,200	1,100	900	Needleandthread----- Little bluestem----- Threadleaf sedge----- Prairie sandreed----- Sand bluestem----- Blue grama----- Sideoats grama----- Plains muhly----- Perennial grasses----- Perennial forbs----- Shrubs-----	15 20 10 10 10 5 10 5 5 5 5
1588: Blueridge-----	Shallow to Gravel; Veg. Zone 2	1,300	900	600	Sand bluestem----- Little bluestem----- Blue grama----- Sand dropseed----- Prairie sandreed----- Needleandthread----- Perennial grasses----- Perennial forbs----- Shrubs----- Hairy grama-----	15 10 25 5 10 10 10 5 5 5
Altvan-----	Silty; Veg. Zone 2	2,100	1,700	1,300	Little bluestem----- Blue grama----- Buffalograss----- Threadleaf sedge----- Western wheatgrass----- Needleandthread----- Perennial grasses----- Perennial forbs-----	10 20 5 5 25 20 10 5
1782: Broadwater-----	Shallow to Gravel; Veg. Zone 2	1,250	900	600	Prairie sandreed----- Sand bluestem----- Sand dropseed----- Sand sagebrush----- Needleandthread----- Blue grama----- Little bluestem----- Sedge----- Clubmoss-----	10 15 10 5 10 30 10 5 5

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
1944:						
Calamus-----	Sandy; Veg. Zone 2	2,600	2,200	1,600	Little bluestem-----	10
					Blue grama-----	20
					Sand dropseed-----	10
					Perennial grasses-----	5
					Perennial forbs-----	5
					Prairie sandreed-----	15
					Sand bluestem-----	10
					Needleandthread-----	10
					Clubmoss-----	5
					Hairy grama-----	5
					Sedge-----	5
2072:						
Chappell-----	Sandy; Veg. Zone 2	2,600	2,300	1,900	Prairie sandreed-----	25
					Needleandthread-----	10
					Blue grama-----	10
					Threadleaf sedge-----	5
					Sand bluestem-----	25
					Little bluestem-----	15
					Perennial grasses-----	5
					Perennial forbs-----	5
Alice-----	Sandy; Veg. Zone 2	2,300	1,600	1,100	Prairie sandreed-----	20
					Needleandthread-----	15
					Blue grama-----	15
					Threadleaf sedge-----	10
					Sand dropseed-----	5
					Prairie junegrass-----	5
					Western wheatgrass-----	5
					Sand bluestem-----	5
					Little bluestem-----	10
					Perennial grasses-----	5
					Perennial forbs-----	5
Broadwater-----	Shallow to Gravel; Veg. Zone 2	1,250	900	600	Prairie sandreed-----	10
					Sand bluestem-----	15
					Sand dropseed-----	10
					Sand sagebrush-----	5
					Needleandthread-----	10
					Blue grama-----	30
					Little bluestem-----	10
					Sedge-----	5
					Clubmoss-----	5
2630:						
Duroc-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Big bluestem-----	15
					Blue grama-----	10
					Green needlegrass-----	10
					Little bluestem-----	10
					Needleandthread-----	15
					Threadleaf sedge-----	10
					Western wheatgrass-----	15
					Buffalograss-----	5
					Perennial grasses-----	5
					Perennial forbs-----	5

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
2638: Duroc-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Big bluestem----- Blue grama----- Green needlegrass----- Little bluestem----- Needleandthread----- Threadleaf sedge----- Western wheatgrass----- Buffalograss----- Perennial grasses----- Perennial forbs-----	15 10 10 10 15 10 15 5 5 5
2639: Duroc-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Big bluestem----- Blue grama----- Green needlegrass----- Little bluestem----- Needleandthread----- Threadleaf sedge----- Western wheatgrass----- Buffalograss----- Perennial grasses----- Perennial forbs-----	15 10 10 10 15 10 15 5 5 5
3050: Glenberg-----	Sandy Lowland; Veg. Zone 1	2,800	2,100	1,300	Little bluestem----- Needleandthread----- Prairie sandreed----- Sand bluestem----- Blue grama----- Switchgrass----- Perennial grasses----- Perennial forbs-----	25 10 20 25 5 5 5 5
3952: Jankosh-----	Saline Subirrigated; Veg. Zone 2	2,900	2,600	2,300	Alkali sacaton----- Inland saltgrass----- Western wheatgrass----- Slender wheatgrass----- Plains bluegrass----- Sedge----- Perennial grasses----- Perennial forbs-----	35 15 15 10 10 5 5 5
4028: Jayem-----	Sandy; Veg. Zone 2	3,000	2,300	1,600	Blue grama----- Fringed sagewort----- Little bluestem----- Needleandthread----- Prairie sandreed----- Sand dropseed----- Threadleaf sedge----- Western wheatgrass----- Sand bluestem----- Switchgrass-----	10 5 15 15 20 5 5 5 15 5

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
4070:						
Johnstown-----	Silty; Veg. Zone 2	3,200	2,500	1,800	Big bluestem-----	20
					Little bluestem-----	15
					Switchgrass-----	5
					Indiangrass-----	5
					Sideoats grama-----	10
					Blue grama-----	10
					Western wheatgrass-----	10
					Perennial grasses-----	10
					Perennial forbs-----	5
					Needleandthread-----	10
Satanta-----	Silty; Veg. Zone 2	3,200	2,500	1,800	Big bluestem-----	15
					Little bluestem-----	15
					Needleandthread-----	15
					Blue grama-----	20
					Sideoats grama-----	10
					Western wheatgrass-----	20
					Perennial grasses-----	5
Richfield-----	Silty; Veg. Zone 2	3,200	2,500	1,800	Big bluestem-----	20
					Little bluestem-----	15
					Switchgrass-----	5
					Indiangrass-----	5
					Sideoats grama-----	10
					Blue grama-----	10
					Western wheatgrass-----	10
					Perennial grasses-----	10
					Perennial forbs-----	5
					Needleandthread-----	10
4151:						
Keith-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Western wheatgrass-----	15
					Blue grama-----	20
					Needleandthread-----	20
					Buffalograss-----	5
					Little bluestem-----	10
					Sedge-----	5
					Big bluestem-----	5
					Sideoats grama-----	5
					Perennial grasses-----	5
					Perennial forbs-----	5
					Green needlegrass-----	5
4152:						
Keith-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Western wheatgrass-----	15
					Blue grama-----	20
					Needleandthread-----	20
					Buffalograss-----	5
					Little bluestem-----	10
					Sedge-----	5
					Big bluestem-----	5
					Sideoats grama-----	5
					Perennial grasses-----	5
					Perennial forbs-----	5
					Green needlegrass-----	5

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
4310: Kuma-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Western wheatgrass-----	15
					Blue grama-----	20
					Needleandthread-----	20
					Buffalograss-----	5
					Little bluestem-----	10
					Sedge-----	5
					Big bluestem-----	5
					Sideoats grama-----	5
					Perennial grasses-----	5
					Perennial forbs-----	5
					Green needlegrass-----	5
4311: Kuma-----	Silty; Veg. Zone 2	3,300	2,500	1,700	Western wheatgrass-----	15
					Blue grama-----	20
					Needleandthread-----	20
					Buffalograss-----	5
					Little bluestem-----	10
					Sedge-----	5
					Big bluestem-----	5
					Sideoats grama-----	5
					Perennial grasses-----	5
					Perennial forbs-----	5
					Green needlegrass-----	5
4472: Las Animas-----	Silty Overflow; Veg. Zone 2	5,000	4,500	4,000	Plains bluegrass-----	5
					Prairie cordgrass-----	15
					Perennial grasses-----	5
					Sedge-----	5
					Perennial forbs-----	5
					Rush-----	5
					Big bluestem-----	20
					Little bluestem-----	25
					Switchgrass-----	5
					Indiangrass-----	10
4475: Las Animas-----	Subirrigated; Veg. Zone 2	5,000	4,500	4,000	Bluejoint-----	15
					Northern reedgrass-----	15
					Plains bluegrass-----	5
					Prairie cordgrass-----	30
					Slender wheatgrass-----	10
					Perennial grasses-----	5
					Sedge-----	10
					Perennial forbs-----	5
					Rush-----	5
4592: Lexsworth-----	Silty Lowland; Veg. Zone 2	2,800	2,000	1,500	Western wheatgrass-----	30
					Needleandthread-----	15
					Blue grama-----	15
					Sedge-----	10
					Big bluestem-----	5
					Little bluestem-----	5
					Sideoats grama-----	5
					Buffalograss-----	5
					Perennial forbs-----	5
					Perennial grasses-----	5

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
4655: Lodgepole-----	Clayey Overflow; Veg. Zone 2	1,200	1,000	700	Western wheatgrass----- Blue grama----- Buffalograss----- Green needlegrass----- Sedge----- Perennial grasses----- Perennial forbs-----	40 15 10 15 10 5 5
5212: Merrick-----	Silty Lowland; Veg. Zone 2	3,800	3,000	2,300	Big bluestem----- Little bluestem----- Switchgrass----- Western wheatgrass----- Needleandthread----- Blue grama----- Perennial grasses----- Perennial forbs-----	20 15 5 20 20 10 5 5
6132: Platte-----	Subirrigated; Veg. Zone 2	4,500	4,100	3,700	Big bluestem----- Switchgrass----- Indiangrass----- Little bluestem----- Prairie cordgrass----- Other perennial grasslikes--- Perennial grasses----- Perennial forbs-----	30 10 10 20 10 10 5 5
6248: Ralton-----	Silty Lowland; Veg. Zone 2	3,800	2,800	2,300	Western wheatgrass----- Needleandthread----- Blue grama----- Sedge----- Big bluestem----- Little bluestem----- Sideoats grama----- Buffalograss----- Perennial forbs----- Perennial grasses-----	30 15 15 10 5 5 5 5 5 5
6625: Sarben-----	Sandy; Veg. Zone 2	3,000	2,600	2,200	Prairie sandreed----- Needleandthread----- Blue grama----- Little bluestem----- Sand bluestem----- Sand sagebrush----- Western wheatgrass----- Sedge----- Perennial forbs-----	20 20 10 15 10 5 5 5 10
6626: Sarben-----	Sandy; Veg. Zone 2	3,000	2,600	2,200	Prairie sandreed----- Needleandthread----- Blue grama----- Little bluestem----- Sand bluestem----- Sand sagebrush----- Western wheatgrass----- Sedge----- Perennial forbs-----	20 20 10 15 10 5 5 5 10

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
6722:						
Satanta-----	Silty; Veg. Zone 2	3,200	2,500	1,800	Big bluestem-----	15
					Little bluestem-----	15
					Needleandthread-----	15
					Blue grama-----	20
					Sideoats grama-----	10
					Western wheatgrass-----	20
					Perennial grasses-----	5
Altvan-----	Silty; Veg. Zone 2	2,900	2,500	2,100	Little bluestem-----	10
					Blue grama-----	20
					Buffalograss-----	5
					Threadleaf sedge-----	5
					Western wheatgrass-----	25
					Needleandthread-----	20
					Perennial grasses-----	10
					Perennial forbs-----	5
6725:						
Satanta-----	Silty; Veg. Zone 2	3,200	2,500	1,800	Big bluestem-----	15
					Little bluestem-----	15
					Needleandthread-----	15
					Blue grama-----	20
					Sideoats grama-----	10
					Western wheatgrass-----	20
					Perennial grasses-----	5
Ascalon-----	Sandy; Veg. Zone 2	3,000	2,300	1,600	Blue grama-----	10
					Fringed sagewort-----	5
					Little bluestem-----	15
					Needleandthread-----	15
					Prairie sandreed-----	20
					Sand dropseed-----	5
					Threadleaf sedge-----	5
					Western wheatgrass-----	5
					Sand bluestem-----	15
					Switchgrass-----	5
6727:						
Satanta-----	Silty; Veg. Zone 2	3,200	2,500	1,800	Big bluestem-----	15
					Little bluestem-----	15
					Needleandthread-----	15
					Blue grama-----	20
					Sideoats grama-----	10
					Western wheatgrass-----	20
					Perennial grasses-----	5
Johnstown-----	Silty; Veg. Zone 2	3,800	3,500	3,000	Big bluestem-----	20
					Little bluestem-----	15
					Switchgrass-----	5
					Indiangrass-----	5
					Sideoats grama-----	10
					Blue grama-----	10
					Western wheatgrass-----	10
					Perennial grasses-----	10
					Perennial forbs-----	5
					Needleandthread-----	10

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
6727: Altvan-----	Silty; Veg. Zone 2	2,900	2,500	2,100	Little bluestem----- Blue grama----- Buffalograss----- Threadleaf sedge----- Western wheatgrass----- Needleandthread----- Perennial grasses----- Perennial forbs-----	10 20 5 5 25 20 10 5
6817: Scoville-----	Sandy; Veg. Zone 2	2,300	1,600	1,100	Prairie sandreed----- Sand bluestem----- Little bluestem----- Blue grama----- Needleandthread----- Threadleaf sedge----- Perennial grasses----- Perennial forbs----- Shrubs-----	25 10 10 15 15 10 5 5 5
6930: Sidney-----	Silty; Veg. Zone 2	2,200	1,500	1,000	Western wheatgrass----- Needleandthread----- Blue grama----- Sedge----- Perennial grasses----- Perennial forbs----- Shrubs-----	30 25 20 5 10 5 5
6937: Sidney-----	Silty; Veg. Zone 2	2,200	1,500	1,000	Western wheatgrass----- Needleandthread----- Blue grama----- Sedge----- Perennial grasses----- Perennial forbs----- Shrubs-----	30 25 20 5 10 5 5
Canyon-----	Shallow Limy; Veg. Zone 2	1,500	1,100	700	Little bluestem----- Threadleaf sedge----- Sideoats grama----- Needleandthread----- Blue grama----- Sand bluestem----- Western wheatgrass----- Perennial forbs----- Shrubs-----	20 5 10 15 20 10 10 5 5
7120: Sulco-----	Limy Upland; Veg. Zone 2	2,800	2,000	1,500	Little bluestem----- Sideoats grama----- Blue grama----- Western wheatgrass----- Big bluestem----- Threadleaf sedge----- Buffalograss----- Plains muhly----- Perennial grasses----- Perennial forbs-----	25 15 15 5 10 10 5 5 5 5

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
7120: McConaughy-----	Silty; Veg. Zone 2	3,250	2,500	1,700	Western wheatgrass----- Sideoats grama----- Little bluestem----- Blue grama----- Big bluestem----- Needleandthread----- Sedge----- Perennial forbs----- Shrubs----- Perennial grasses-----	20 5 10 15 10 15 5 5 5 10
7121: Sulco-----	Limy Upland; Veg. Zone 2	2,800	2,000	1,500	Little bluestem----- Sideoats grama----- Blue grama----- Western wheatgrass----- Big bluestem----- Threadleaf sedge----- Buffalograss----- Plains muhly----- Perennial grasses----- Perennial forbs-----	25 15 15 5 10 10 5 5 5 5
McConaughy-----	Silty; Veg. Zone 2	3,250	2,500	1,700	Western wheatgrass----- Sideoats grama----- Little bluestem----- Blue grama----- Big bluestem----- Needleandthread----- Sedge----- Perennial forbs----- Shrubs----- Perennial grasses-----	20 5 10 15 10 15 5 5 5 10
7122: Sulco-----	Limy Upland; Veg. Zone 2	2,800	2,000	1,500	Little bluestem----- Sideoats grama----- Blue grama----- Western wheatgrass----- Big bluestem----- Threadleaf sedge----- Buffalograss----- Plains muhly----- Perennial grasses----- Perennial forbs-----	25 15 15 5 10 10 5 5 5 5
McConaughy-----	Silty; Veg. Zone 2	3,250	2,500	1,700	Western wheatgrass----- Sideoats grama----- Little bluestem----- Blue grama----- Big bluestem----- Needleandthread----- Sedge----- Perennial forbs----- Shrubs----- Perennial grasses-----	20 5 10 15 10 15 5 5 5 10

Table 9.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Maximum rangeland compo- sition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
7582: Valent-----	Sands; Veg. Zone 2	2,800	2,400	1,800	Prairie sandreed----- Sand bluestem----- Little bluestem----- Blue grama----- Needleandthread----- Threadleaf sedge----- Perennial grasses----- Perennial forbs----- Shrubs----- Switchgrass-----	20 25 10 5 10 5 5 5 5 10
7586: Valent-----	Sands; Veg. Zone 2	2,800	2,400	1,800	Prairie sandreed----- Sand bluestem----- Little bluestem----- Blue grama----- Needleandthread----- Threadleaf sedge----- Perennial grasses----- Perennial forbs----- Shrubs----- Switchgrass-----	20 25 10 5 10 5 5 5 5 10
7588: Valent, rolling	Sands; Veg. Zone 2	2,800	2,400	1,800	Prairie sandreed----- Sand bluestem----- Little bluestem----- Blue grama----- Needleandthread----- Threadleaf sedge----- Perennial grasses----- Perennial forbs----- Shrubs----- Switchgrass-----	20 25 10 5 10 5 5 5 5 10
Valent, hilly--	Choppy Sands; Veg. Zone 2	2,300	1,600	1,200	Prairie sandreed----- Sand bluestem----- Little bluestem----- Blue grama----- Needleandthread----- Perennial grasses----- Perennial forbs----- Shrubs----- Switchgrass-----	20 30 15 5 5 5 5 5 10

Table 10.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1130: Alliance-----	Amur honeysuckle, common lilac, skunkbush sumac	Rocky Mountain juniper	Bur oak, common hackberry, eastern redcedar, Russian olive, green ash, honeylocust, ponderosa pine	Siberian elm	---
1146: Alliance-----	Amur honeysuckle, common lilac, skunkbush sumac	Rocky Mountain juniper	Bur oak, common hackberry, eastern redcedar, Russian olive, green ash, honeylocust, ponderosa pine	Siberian elm	---
Rosebud-----	Common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper, common hackberry, eastern redcedar, green ash	Honeylocust, Russian olive, ponderosa pine, Siberian elm	---	---
1198: Altvan-----	Common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper, common hackberry, eastern redcedar, green ash, Russian olive	Honeylocust, ponderosa pine, Siberian elm	---	---
Eckley-----	Common lilac, eastern redcedar, Rocky Mountain juniper, Russian olive, Siberian peashrub	Green ash, common hackberry, ponderosa pine, Siberian elm	---	---	---
Satanta-----	American plum, common chokecherry, Tatarian honeysuckle	Autumn olive, Rocky Mountain juniper	Eastern redcedar, common hackberry, green ash, black locust, honeylocust, ponderosa pine	Siberian elm	---
1295: Ashollow-----	Common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper, Russian olive, black locust, common hackberry, eastern redcedar, green ash, ponderosa pine	Honeylocust, Siberian elm	---	---
Tassel.					

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1588: Blueridge.					
Altvan-----	Common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper, common hackberry, eastern redcedar, green ash, Russian olive	Honeylocust, ponderosa pine, Siberian elm	---	---
1782: Broadwater.					
1944: Calamus-----	---	Rocky Mountain juniper	Austrian pine, eastern redcedar, jack pine, ponderosa pine, Scotch pine	---	---
2072: Chappell-----	Common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper, common hackberry, eastern redcedar, green ash, Russian olive	Honeylocust, ponderosa pine, Siberian elm	---	---
Alice-----	American plum, common lilac, Siberian peashrub, skunkbush sumac	Eastern redcedar, Rocky Mountain juniper, Russian olive	Common hackberry, green ash, honeylocust, ponderosa pine	Siberian elm	---
Broadwater.					
2630: Duroc-----	American plum, Amur honeysuckle, common lilac	---	Eastern redcedar, ponderosa pine, Rocky Mountain juniper, Russian olive, common hackberry, green ash, honeylocust	Siberian elm	Eastern cottonwood
2638: Duroc-----	American plum, Amur honeysuckle, common lilac	---	Eastern redcedar, ponderosa pine, Rocky Mountain juniper, Russian olive, common hackberry, green ash, honeylocust	Siberian elm	Eastern cottonwood
2639: Duroc-----	American plum, Amur honeysuckle, common lilac	---	Eastern redcedar, ponderosa pine, Rocky Mountain juniper, Russian olive, common hackberry, green ash, honeylocust	Siberian elm	Eastern cottonwood

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3050: Glenberg-----	American plum, Siberian peashrub	---	Bur oak, eastern redcedar, Rocky Mountain juniper, Russian olive, common hackberry, green ash, ponderosa pine	Black locust	Eastern cottonwood
3140: Gothenburg.					
3952: Jankosh.					
4028: Jayem-----	Amur honeysuckle, common chokecherry, common lilac, Siberian peashrub	Eastern redcedar, Rocky Mountain juniper, Russian olive	Green ash, ponderosa pine, honeylocust, Siberian elm	---	---
4070: Johnstown-----	American plum, skunkbush sumac	Siberian peashrub	Bur oak, common hackberry, eastern redcedar, Russian olive, green ash, honeylocust, ponderosa pine	Siberian elm	---
Satanta-----	American plum, common chokecherry, Tatarian honeysuckle	Autumn olive, Rocky Mountain juniper	Eastern redcedar, common hackberry, green ash, black locust, honeylocust, ponderosa pine	Siberian elm	---
Richfield-----	Amur honeysuckle, common lilac	Common chokecherry	Bur oak, eastern redcedar, ponderosa pine, Russian olive, green ash, honeylocust	Siberian elm	---
4151: Keith-----	American plum, common chokecherry, common lilac, Siberian peashrub	Manchurian crabapple, Rocky Mountain juniper	Common hackberry, green ash, Russian olive, honeylocust, ponderosa pine	Siberian elm	---
4152: Keith-----	American plum, common chokecherry, common lilac, Siberian peashrub	Manchurian crabapple, Rocky mountain juniper	Common hackberry, green ash, Russian olive, honeylocust, ponderosa pine	Siberian elm	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
4310: Kuma-----	Amur honeysuckle, common lilac	Common chokecherry	Bur oak, eastern redcedar, ponderosa pine, Russian olive, green ash, honeylocust	Siberian elm	---
4311: Kuma-----	Amur honeysuckle, common lilac	Common chokecherry	Bur oak, eastern redcedar, ponderosa pine, Russian olive, green ash, honeylocust	Siberian elm	---
4472: Las Animas.					
4475: Las Animas.					
4592: Lexsworth-----	---	American plum, common lilac, Siberian peashrub	Eastern redcedar, Manchurian crabapple, ponderosa pine	Common hackberry, green ash, honeylocust, golden willow	Eastern cottonwood
4655: Lodgepole-----	American plum, common chokecherry, common lilac	---	Eastern redcedar, common hackberry, ponderosa pine, green ash, honeylocust, Russian mulberry	Golden willow, silver maple	---
5212: Merrick-----	---	American plum, common lilac, Siberian peashrub	Eastern redcedar, Manchurian crabapple, ponderosa pine	Common hackberry, green ash, honeylocust, golden willow	Eastern cottonwood
6132: Platte-----	American plum, redosier dogwood	Common chokecherry	Eastern redcedar, Austrian pine, common hackberry, Russian olive	Green ash, honeylocust, golden willow, silver maple	Eastern cottonwood
6248: Ralton-----	American plum, common lilac	---	Rocky Mountain juniper, Russian olive, eastern redcedar, ponderosa pine, common hackberry, green ash	Honeylocust, Siberian elm	Eastern cottonwood
6625: Sarben-----	American plum, Amur honeysuckle, common chokecherry, common lilac	---	Common hackberry, eastern redcedar, Rocky Mountain juniper, Russian mulberry, green ash, ponderosa pine, honeylocust	Siberian elm	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
6626: Sarben-----	American plum, Amur honeysuckle, common chokecherry, common lilac	---	Common hackberry, eastern redcedar, Rocky Mountain juniper, Russian mulberry, green ash, ponderosa pine, honeylocust	Siberian elm	---
6722: Satanta-----	American plum, common chokecherry, Tatarian honeysuckle	Autumn olive, Rocky Mountain juniper	Eastern redcedar, common hackberry, green ash, black locust, honeylocust, ponderosa pine	Siberian elm	---
Altvan-----	Common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper, common hackberry, eastern redcedar, green ash, Russian olive	Honeylocust, ponderosa pine, Siberian elm	---	---
6725: Satanta-----	American plum, common chokecherry, Tatarian honeysuckle	Eastern redcedar, Rocky Mountain juniper	Common hackberry, green ash, ponderosa pine, black locust, honeylocust, Siberian elm	---	---
Ascalon-----	American plum, Amur honeysuckle, common chokecherry, common lilac	---	Common hackberry, eastern redcedar, Rocky Mountain juniper, Russian mulberry, Siberian elm, green ash, ponderosa pine, honeylocust	---	---
6727: Satanta-----	American plum, common chokecherry, Tatarian honeysuckle	Autumn olive, Rocky Mountain juniper	Eastern redcedar, common hackberry, green ash, black locust, honeylocust, ponderosa pine	Siberian elm	---
Johnstown-----	American plum, skunkbush sumac	Siberian peashrub	Bur oak, common hackberry, eastern redcedar, Russian olive, green ash, honeylocust, ponderosa pine	Siberian elm	---
Altvan-----	Common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper, common hackberry, eastern redcedar, green ash, Russian olive	Honeylocust, ponderosa pine, Siberian elm	---	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
6817: Scoville-----	American plum, common lilac, Siberian peashrub, skunkbush sumac	Eastern redcedar, Rocky Mountain juniper, Russian olive	Common hackberry, green ash, honeylocust, ponderosa pine	Siberian elm	---
6930: Sidney-----	Common lilac, Siberian peashrub, silver buffaloberry, skunkbush sumac	Rocky Mountain juniper, Russian olive	Common hackberry, eastern redcedar, green ash, ponderosa pine, Siberian elm, honeylocust	---	---
6937: Sidney-----	Common lilac, Siberian peashrub, silver buffaloberry, skunkbush sumac	Rocky Mountain juniper, Russian olive	Common hackberry, eastern redcedar, green ash, ponderosa pine, Siberian elm, honeylocust	---	---
Canyon.					
7120: Sulco-----	Common lilac, Siberian peashrub, silver buffaloberry, Tatarian honeysuckle	Eastern redcedar, Rocky Mountain juniper	Black locust, common hackberry, green ash, honeylocust, ponderosa pine, Siberian elm	---	---
McConaughy-----	American plum, common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper	Common hackberry, eastern redcedar, green ash, Russian olive, ponderosa pine, honeylocust	Siberian elm	---
7121: Sulco-----	Common lilac, Siberian peashrub, silver buffaloberry, Tatarian honeysuckle	Eastern redcedar, Rocky Mountain juniper	Black locust, common hackberry, green ash, honeylocust, ponderosa pine, Siberian elm	---	---
McConaughy-----	American plum, common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper	Common hackberry, eastern redcedar, green ash, Russian olive, ponderosa pine, honeylocust	Siberian elm	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
7122: Sulco-----	Common lilac, Siberian peashrub, silver buffaloberry, Tatarian honeysuckle	Eastern redcedar, Rocky Mountain juniper	Black locust, common hackberry, green ash, honeylocust, ponderosa pine, Siberian elm	---	---
McConaughy-----	American plum, common lilac, Siberian peashrub, skunkbush sumac	Rocky Mountain juniper	Common hackberry, eastern redcedar, green ash, Russian olive, ponderosa pine, honeylocust	Siberian elm	---
7582: Valent-----	---	Eastern redcedar, Rocky Mountain juniper	Austrian pine, jack pine, ponderosa pine	---	---
7586: Valent-----	---	Eastern redcedar, Rocky Mountain juniper	Austrian pine, jack pine, ponderosa pine	---	---
7588: Valent, rolling-	---	Eastern redcedar, Rocky Mountain juniper	Austrian pine, jack pine, ponderosa pine	---	---
Valent, hilly---	---	Eastern redcedar, Rocky Mountain juniper	Austrian pine, jack pine, ponderosa pine	---	---

Table 11a.--Recreation Interpretations

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50
1146: Alliance-----	65	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty Slope	0.50 0.05
Rosebud-----	25	Not limited		Not limited		Somewhat limited: Slope	0.05
1198: Altvan-----	45	Not limited		Not limited		Somewhat limited: Slope	0.94
Eckley-----	30	Not limited		Not limited		Somewhat limited: Slope	0.94
Satanta, sandy substratum-----	20	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Slope Dusty	0.94 0.50
1295: Ashollow-----	65	Somewhat limited: Slope Dusty	0.84 0.50	Somewhat limited: Slope Dusty	0.84 0.50	Very limited: Slope Dusty	1.00 0.50
Tassel-----	30	Very limited: Slope Depth to bedrock	1.00 1.00	Very limited: Slope Depth to bedrock	1.00 1.00	Very limited: Slope Depth to bedrock	1.00 1.00
1588: Blueridge-----	50	Very limited: Too sandy Slope Gravel content	1.00 1.00 0.03	Very limited: Too sandy Slope Gravel content	1.00 1.00 0.03	Very limited: Too sandy Slope Gravel content	1.00 1.00 1.00
Altvan-----	35	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Very limited: Slope Dusty	1.00 0.50
1782: Broadwater, frequently flooded-	90	Very limited: Flooding Too sandy	1.00 0.32	Somewhat limited: Flooding Too sandy	0.40 0.32	Very limited: Flooding Too sandy	1.00 0.32
1944: Calamus, very rarely flooded-----	95	Very limited: Flooding Too sandy	1.00 0.32	Somewhat limited: Too sandy	0.32	Somewhat limited: Too sandy	0.32

Table 11a.--Recreation Interpretations--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2072: Chappell-----	38	Not limited		Not limited		Somewhat limited: Slope	0.01
Alice-----	33	Not limited		Not limited		Somewhat limited: Slope	0.01
Broadwater-----	24	Very limited: Flooding Too sandy	1.00 0.32	Somewhat limited: Too sandy	0.32	Somewhat limited: Flooding Too sandy Slope	0.60 0.32 0.01
2630: Duroc-----	90	Not limited		Not limited		Not limited Slope	0.01
2638: Duroc-----	90	Not limited		Not limited		Not limited	
2639: Duroc-----	90	Not limited		Not limited		Somewhat limited: Slope	0.01
3050: Glenberg, rarely flooded-----	90	Very limited: Flooding	1.00	Not limited		Not limited	
3140: Gothenburg, occasionally flooded-----	85	Very limited: Flooding Depth to saturated zone Too sandy	1.00 1.00 0.32	Very limited: Depth to saturated zone Too sandy	1.00 0.32	Very limited: Depth to saturated zone Flooding Too sandy	1.00 0.60 0.32
3952: Jankosh-----	85	Very limited: Sodium content Flooding Salinity Depth to saturated zone	1.00 1.00 1.00 0.08	Very limited: Sodium content Salinity Depth to saturated zone	1.00 1.00 0.03	Very limited: Sodium content Salinity Depth to saturated zone	1.00 1.00 0.08
4028: Jayem-----	90	Not limited		Not limited		Not limited	
4070: Johnstown-----	35	Not limited		Not limited		Not limited	
Satanta, sandy substratum-----	31	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50
Richfield-----	29	Somewhat limited: Dusty Restricted permeability	0.50 0.45	Somewhat limited: Dusty Restricted permeability	0.50 0.45	Somewhat limited: Dusty Restricted permeability	0.50 0.45

Table 11a.--Recreation Interpretations--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4151: Keith-----	90	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty Slope	0.50 0.05
4152: Keith-----	90	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Slope Dusty	0.64 0.50
4310: Kuma-----	95	Not limited		Not limited		Not limited	
4311: Kuma-----	90	Not limited		Not limited		Somewhat limited: Slope	0.05
4472: Las Animas, frequently flooded-	95	Very limited: Flooding Depth to saturated zone	1.00 1.00	Very limited: Depth to saturated zone Flooding	1.00 0.40	Very limited: Flooding Depth to saturated zone	1.00 1.00
4475: Las Animas, occasionally flooded-----	92	Very limited: Flooding Depth to saturated zone	1.00 0.08	Somewhat limited: Depth to saturated zone	0.03	Somewhat limited: Flooding Depth to saturated zone	0.60 0.08
4592: Lexsworth, very rarely flooded----	85	Very limited: Flooding Dusty	1.00 0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50
4655: Lodgepole, ponded---	95	Very limited: Depth to saturated zone Ponding Restricted permeability	1.00 1.00 1.00	Very limited: Ponding Depth to saturated zone Restricted permeability	1.00 1.00 1.00	Very limited: Depth to saturated zone Ponding Restricted permeability	1.00 1.00 1.00
5212: Merrick, very rarely flooded-----	90	Very limited: Flooding	1.00	Not limited		Not limited	
6132: Platte, occasionally flooded-----	90	Very limited: Flooding Depth to saturated zone	1.00 0.44	Somewhat limited: Depth to saturated zone	0.19	Somewhat limited: Flooding Depth to saturated zone	0.60 0.44

Table 11a.--Recreation Interpretations--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6248: Ralton, very rarely flooded-----	90	Very limited: Flooding	1.00	Not limited		Not limited	
6625: Sarben-----	90	Somewhat limited: Too sandy	0.12	Somewhat limited: Too sandy	0.12	Somewhat limited: Too sandy Slope	0.12 0.05
6626: Sarben-----	90	Somewhat limited: Too sandy	0.12	Somewhat limited: Too sandy	0.12	Somewhat limited: Slope Too sandy	0.64 0.12
6722: Satanta-----	65	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Slope Dusty	0.64 0.50
Altvan-----	25	Not limited		Not limited		Somewhat limited: Slope	0.64
6725: Satanta, sandy substratum-----	45	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50
Ascalon-----	45	Not limited		Not limited		Not limited	
6727: Satanta, sandy substratum-----	60	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty Slope	0.50 0.05
Johnstown-----	18	Not limited		Not limited		Somewhat limited: Slope	0.05
Altvan-----	15	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty Slope	0.50 0.05
6817: Scoville-----	95	Somewhat limited: Too sandy	0.04	Somewhat limited: Too sandy	0.04	Somewhat limited: Too sandy	0.04
6930: Sidney-----	85	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Slope Dusty	0.64 0.50
6937: Sidney-----	65	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Very limited: Slope Dusty	1.00 0.50

Table 11a.--Recreation Interpretations--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6937: Canyon-----	25	Very limited: Depth to bedrock Dusty	1.00 0.50	Very limited: Depth to bedrock Dusty	1.00 0.50	Very limited: Depth to bedrock Slope Dusty	1.00 1.00 0.50
7120: Sulco, moderately eroded-----	55	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Slope Dusty	0.77 0.50
McConaughy, moderately eroded--	30	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty Slope	0.50 0.48
7121: Sulco, moderately eroded-----	65	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Very limited: Slope Dusty	1.00 0.50
McConaughy, moderately eroded--	25	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Very limited: Slope Dusty	1.00 0.50
7122: Sulco, moderately eroded-----	70	Very limited: Slope Dusty	1.00 0.50	Very limited: Slope Dusty	1.00 0.50	Very limited: Slope Dusty	1.00 0.50
McConaughy, moderately eroded--	20	Somewhat limited: Slope Dusty	0.63 0.50	Somewhat limited: Slope Dusty	0.63 0.50	Very limited: Slope Dusty	1.00 0.50
7582: Valent-----	90	Not limited		Not limited		Somewhat limited: Slope	0.94
7586: Valent-----	95	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00
7588: Valent, rolling-----	50	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00
Valent, hilly-----	45	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00

Table 11b.--Recreation Interpretations

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
1146: Alliance-----	65	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
Rosebud-----	25	Not limited		Not limited		Somewhat limited: Depth to bedrock	0.42
1198: Altvan-----	45	Not limited		Not limited		Not limited	
Eckley-----	30	Not limited		Not limited		Somewhat limited: Droughty	0.89
Satanta, sandy substratum-----	20	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
1295: Ashollow-----	65	Very limited: Water erosion Dusty	1.00 0.50	Very limited: Water erosion Dusty	1.00 0.50	Somewhat limited: Slope	0.84
Tassel-----	30	Somewhat limited: Slope	0.50	Not limited		Very limited: Depth to bedrock Droughty Slope	1.00 1.00 1.00
1588: Blueridge-----	50	Very limited: Too sandy Slope	1.00 0.18	Very limited: Too sandy	1.00	Very limited: Too sandy Droughty Slope Gravel content	1.00 1.00 1.00 0.03
Altvan-----	35	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
1782: Broadwater, frequently flooded-	90	Somewhat limited: Flooding Too sandy	0.40 0.32	Somewhat limited: Flooding Too sandy	0.40 0.32	Very limited: Flooding Droughty	1.00 1.00
1944: Calamus, very rarely flooded-----	95	Somewhat limited: Too sandy	0.32	Somewhat limited: Too sandy	0.32	Somewhat limited: Droughty	0.75

Table 11b.--Recreation Interpretations--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2072: Chappell-----	38	Not limited		Not limited		Not limited	
Alice-----	33	Not limited		Not limited		Not limited	
Broadwater-----	24	Somewhat limited: Too sandy	0.32	Somewhat limited: Too sandy	0.32	Very limited: Droughty Flooding	1.00 0.60
2630: Duroc-----	90	Not limited		Not limited		Not limited	
2638: Duroc-----	90	Not limited		Not limited		Not limited	
2639: Duroc-----	90	Not limited		Not limited		Not limited	
3050: Glenberg, rarely flooded-----	90	Not limited		Not limited		Not limited	
3140: Gothenburg, occasionally flooded-----	85	Very limited: Depth to saturated zone Too sandy	1.00 0.32	Very limited: Depth to saturated zone Too sandy	1.00 0.32	Very limited: Droughty Depth to saturated zone Flooding	1.00 1.00 0.60
3952: Jankosh-----	85	Not limited		Not limited		Very limited: Sodium content Salinity Depth to saturated zone	1.00 1.00 0.03
4028: Jayem-----	90	Not limited		Not limited		Not limited	
4070: Johnstown-----	35	Not limited		Not limited		Not limited	
Satanta, sandy substratum-----	31	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
Richfield-----	29	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
4151: Keith-----	90	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
4152: Keith-----	90	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	

Table 11b.--Recreation Interpretations--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4310: Kuma-----	95	Not limited		Not limited		Not limited	
4311: Kuma-----	90	Not limited		Not limited		Not limited	
4472: Las Animas, frequently flooded-	95	Very limited: Depth to saturated zone Flooding	1.00 0.40	Very limited: Depth to saturated zone Flooding	1.00 0.40	Very limited: Flooding Depth to saturated zone	1.00 1.00
4475: Las Animas, occasionally flooded-----	92	Not limited		Not limited		Somewhat limited: Flooding Depth to saturated zone	0.60 0.03
4592: Lexsworth, very rarely flooded----	85	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
4655: Lodgepole, ponded---	95	Very limited: Depth to saturated zone Ponding	1.00 1.00	Very limited: Depth to saturated zone Ponding	1.00 1.00	Very limited: Ponding Depth to saturated zone	1.00 1.00
5212: Merrick, very rarely flooded-----	90	Not limited		Not limited		Not limited	
6132: Platte, occasionally flooded-----	90	Not limited		Not limited		Somewhat limited: Flooding Depth to saturated zone Droughty	0.60 0.19 0.05
6248: Ralton, very rarely flooded-----	90	Not limited		Not limited		Not limited	
6625: Sarben-----	90	Somewhat limited: Too sandy	0.12	Somewhat limited: Too sandy	0.12	Somewhat limited: Droughty	0.01
6626: Sarben-----	90	Somewhat limited: Too sandy	0.12	Somewhat limited: Too sandy	0.12	Somewhat limited: Droughty	0.01

Table 11b.--Recreation Interpretations--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6722: Satanta-----	65	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
Altvan-----	25	Not limited		Not limited		Not limited	
6725: Satanta, sandy substratum-----	45	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
Ascalon-----	45	Not limited		Not limited		Not limited	
6727: Satanta, sandy substratum-----	60	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
Johnstown-----	18	Not limited		Not limited		Not limited	
Altvan-----	15	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
6817: Scoville-----	95	Somewhat limited: Too sandy	0.04	Somewhat limited: Too sandy	0.04	Somewhat limited: Droughty	0.61
6930: Sidney-----	85	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
6937: Sidney-----	65	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
Canyon-----	25	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Very limited: Droughty Depth to bedrock	1.00 1.00
7120: Sulco, moderately eroded-----	55	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
McConaughy, moderately eroded--	30	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
7121: Sulco, moderately eroded-----	65	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	
McConaughy, moderately eroded--	25	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Not limited	

Table 11b.--Recreation Interpretations--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7122: Sulco, moderately eroded-----	70	Very limited: Water erosion Dusty	1.00 0.50	Very limited: Water erosion Dusty	1.00 0.50	Very limited: Slope	1.00
McConaughy, moderately eroded--	20	Somewhat limited: Dusty	0.50	Somewhat limited: Dusty	0.50	Somewhat limited: Slope	0.63
7582: Valent-----	90	Not limited		Not limited		Somewhat limited: Droughty	0.89
7586: Valent-----	95	Somewhat limited: Slope	0.08	Not limited		Very limited: Slope Droughty	1.00 0.89
7588: Valent, rolling-----	50	Somewhat limited: Slope	0.08	Not limited		Very limited: Slope Droughty	1.00 0.89
Valent, hilly-----	45	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope Droughty	1.00 0.89

Table 12.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
1130: Alliance-----	Good	Good	Good	Good	Good	Good	Very poor	Poor	Good	Good	Poor	Good
1146: Alliance-----	Good	Good	Good	Good	Good	Good	Very poor	Poor	Good	Good	Poor	Good
Rosebud-----	Good	Good	Fair	---	Good	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
1198: Altvan-----	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
Eckley-----	Poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
Satanta-----	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
1295: Ashollow-----	Poor	Poor	Fair	Poor	Fair	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
Tassel-----	Poor	Poor	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Fair	Very poor	Poor
1588: Blueridge-----	Poor	Poor	Poor	Poor	Poor	Poor	Very poor	Very poor	Very poor	Poor	Very poor	Poor
Altvan-----	Poor	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Good	Good	Very poor	Good
1782: Broadwater-----	Poor	Fair	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
1944: Calamus-----	Poor	Good	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor	Fair
2072: Chappell-----	Fair	Good	Good	---	Good	Good	Very poor	Very poor	Fair	---	Very poor	Good
Alice-----	Fair	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Broadwater-----	Poor	Fair	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
2630: Duroc-----	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
2638: Duroc-----	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
2639:												
Duroc-----	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
3050:												
Glenberg-----	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
3140:												
Gothenburg-----	Very poor	Very poor	Fair	Poor	Fair	Fair	Fair	Good	Poor	Poor	Fair	Fair
3952:												
Jankosh-----	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Very poor	Fair	Poor	Very poor	Poor	Very poor
4028:												
Jayem-----	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
4070:												
Johnstown-----	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Fair	Very poor	Good
Satanta-----	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Richfield-----	Fair	Good	Fair	Poor	Fair	Poor	Very poor	Very poor	Fair	---	Very poor	Fair
4151:												
Keith-----	Good	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
4152:												
Keith-----	Good	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
4310:												
Kuma-----	Good	Good	Good	Fair	Good	Poor	Poor	Very poor	Fair	---	Very poor	Poor
4311:												
Kuma-----	Good	Good	Fair	Fair	Good	Poor	Poor	Very poor	Fair	---	Very poor	Poor
4472:												
Las Animas-----	Very poor	Poor	Fair	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Fair
4475:												
Las Animas-----	Very poor	Poor	Fair	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Fair
4592:												
Lexsworth-----	Fair	Fair	Good	Good	Good	Good	Poor	Poor	Fair	Good	Poor	Good
4655:												
Lodgepole-----	Poor	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good	Poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
5212: Merrick-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Poor	Good	Poor	Good
6132: Platte-----	Fair	Good	Fair	Poor	Fair	Good	Fair	Good	Fair	Poor	Good	Fair
6248: Ralton-----	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
6625: Sarben-----	Fair	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
6626: Sarben-----	Fair	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
6722: Satanta-----	Fair	Good	Fair	Poor	Fair	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
Altvan-----	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
6725: Satanta-----	Good	Good	Fair	Poor	Fair	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Ascalon-----	Good	Good	Fair	Poor	Fair	Fair	Poor	Very poor	Good	---	Very poor	Fair
6727: Satanta-----	Good	Good	Fair	Poor	Fair	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Johnstown-----	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Fair	Very poor	Good
Altvan-----	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
6817: Scoville-----	Poor	Fair	Fair	Poor	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Very poor
6930: Sidney-----	Fair	Good	Good	Fair	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
6937: Sidney-----	Fair	Good	Good	Fair	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
Canyon-----	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Very poor	Poor	Fair	Very poor	Fair

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
7120:												
Sulco-----	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
McConaughy-----	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
7121:												
Sulco-----	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
McConaughy-----	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
7122:												
Sulco-----	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
McConaughy-----	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
7582:												
Valent-----	Poor	Fair	Fair	Poor	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor	Fair
7586:												
Valent-----	Poor	Poor	Poor	Poor	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor	Fair
7588:												
Valent, rolling-	Poor	Poor	Poor	Poor	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor	Fair
Valent, hilly---	Very poor	Very poor	Poor	Poor	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor	Fair

Table 13a.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Not limited		Not limited		Not limited	
1146: Alliance-----	65	Not limited		Not limited		Not limited	
Rosebud-----	25	Not limited		Somewhat limited: Depth to soft bedrock	0.42	Not limited	
1198: Altvan-----	45	Not limited		Not limited		Somewhat limited: Slope	0.47
Eckley-----	30	Not limited		Not limited		Somewhat limited: Slope	0.47
Satanta, sandy substratum-----	20	Not limited		Not limited		Somewhat limited: Slope	0.47
1295: Ashollow-----	65	Somewhat limited: Slope	0.84	Somewhat limited: Slope	0.84	Very limited: Slope	1.00
Tassel-----	30	Very limited: Slope Depth to soft bedrock	1.00 1.00	Very limited: Depth to soft bedrock Slope	1.00 1.00	Very limited: Slope Depth to soft bedrock	1.00 1.00
1588: Blueridge-----	50	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00
Altvan-----	35	Not limited		Not limited		Very limited: Slope	1.00
1782: Broadwater, frequently flooded-	90	Very limited: Flooding	1.00	Very limited: Flooding	1.00	Very limited: Flooding	1.00
1944: Calamus, very rarely flooded-----	95	Very limited: Flooding	1.00	Very limited: Flooding Depth to saturated zone	0.35	Very limited: Flooding	1.00

Table 13a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2072: Chappell-----	38	Not limited		Not limited		Not limited	
Alice-----	33	Not limited		Not limited		Not limited	
Broadwater-----	24	Very limited: Flooding	1.00	Very limited: Flooding	1.00	Very limited: Flooding	1.00
2630: Duroc-----	90	Not limited		Not limited		Not limited	
2638: Duroc-----	90	Not limited		Not limited		Not limited	
2639: Duroc-----	90	Not limited		Not limited		Not limited	
3050: Glenberg, rarely flooded-----	90	Very limited: Flooding	1.00	Very limited: Flooding	1.00	Very limited: Flooding	1.00
3140: Gothenburg, occasionally flooded-----	85	Very limited: Flooding Depth to saturated zone	1.00 1.00	Very limited: Flooding Depth to saturated zone	1.00 1.00	Very limited: Flooding Depth to saturated zone	1.00 1.00
3952: Jankosh-----	85	Very limited: Flooding Depth to saturated zone	1.00 0.08	Very limited: Flooding Depth to saturated zone	1.00 1.00	Very limited: Flooding Depth to saturated zone	1.00 0.08
4028: Jayem-----	90	Not limited		Not limited		Not limited	
4070: Johnstown-----	35	Somewhat limited: Shrink-swell	0.50	Somewhat limited: Shrink-swell	0.50	Somewhat limited: Shrink-swell	0.50
Satanta, sandy substratum-----	31	Somewhat limited: Shrink-swell	0.50	Not limited		Somewhat limited: Shrink-swell	0.50
Richfield-----	29	Not limited		Not limited		Not limited	
4151: Keith-----	90	Somewhat limited: Shrink-swell	0.50	Not limited		Somewhat limited: Shrink-swell	0.50
4152: Keith-----	90	Not limited		Not limited		Somewhat limited: Slope	0.03
4310: Kuma-----	95	Not limited		Not limited		Not limited	

Table 13a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4311: Kuma-----	90	Somewhat limited: Shrink-swell	0.50	Not limited		Somewhat limited: Shrink-swell	0.50
4472: Las Animas, frequently flooded-	95	Very limited: Flooding Depth to saturated zone	1.00 1.00	Very limited: Flooding Depth to saturated zone	1.00 1.00	Very limited: Flooding Depth to saturated zone	1.00 1.00
4475: Las Animas, occasionally flooded-----	92	Very limited: Flooding Depth to saturated zone	1.00 0.08	Very limited: Flooding Depth to saturated zone	1.00 1.00	Very limited: Flooding Depth to saturated zone	1.00 0.08
4592: Lexsworth, very rarely flooded----	85	Very limited: Flooding	1.00	Very limited: Flooding	1.00	Very limited: Flooding	1.00
4655: Lodgepole, ponded---	95	Very limited: Ponding Depth to saturated zone Shrink-swell	1.00 1.00 1.00	Very limited: Ponding Depth to saturated zone	1.00 1.00	Very limited: Ponding Depth to saturated zone Shrink-swell	1.00 1.00 1.00
5212: Merrick, very rarely flooded-----	90	Very limited: Flooding Shrink-swell	1.00 0.50	Very limited: Flooding Shrink-swell Depth to saturated zone	1.00 0.50 0.15	Very limited: Flooding Shrink-swell	1.00 0.50
6132: Platte, occasionally flooded-----	90	Very limited: Flooding Depth to saturated zone	1.00 0.44	Very limited: Flooding Depth to saturated zone	1.00 1.00	Very limited: Flooding Depth to saturated zone	1.00 0.44
6248: Ralton, very rarely flooded-----	90	Very limited: Flooding	1.00	Very limited: Flooding Depth to saturated zone	1.00 0.35	Very limited: Flooding	1.00
6625: Sarben-----	90	Not limited		Not limited		Not limited	

Table 13a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6626: Sarben-----	90	Not limited		Not limited		Somewhat limited: Slope	0.03
6722: Satanta-----	65	Not limited		Not limited		Somewhat limited: Slope	0.03
Altvan-----	25	Not limited		Not limited		Somewhat limited: Slope	0.03
6725: Satanta, sandy substratum-----	45	Somewhat limited: Shrink-swell	0.50	Not limited		Somewhat limited: Shrink-swell	0.50
Ascalon-----	45	Not limited		Not limited		Not limited	
6727: Satanta, sandy substratum-----	60	Somewhat limited: Shrink-swell	0.50	Not limited		Somewhat limited: Shrink-swell	0.50
Johnstown-----	18	Somewhat limited: Shrink-swell	0.50	Not limited		Somewhat limited: Shrink-swell	0.50
Altvan-----	15	Not limited		Not limited		Not limited	
6817: Scoville-----	95	Not limited		Not limited		Not limited	
6930: Sidney-----	85	Not limited		Not limited		Somewhat limited: Slope	0.03
6937: Sidney-----	65	Not limited		Not limited		Somewhat limited: Slope	0.96
Canyon-----	25	Somewhat limited: Depth to soft bedrock	1.00	Very limited: Depth to soft bedrock	1.00	Somewhat limited: Depth to soft bedrock Slope	1.00 0.96
7120: Sulco, moderately eroded-----	55	Not limited		Not limited		Somewhat limited: Slope	0.12
McConaughy, moderately eroded--	30	Not limited		Not limited		Not limited	

Table 13a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7121: Sulco, moderately eroded-----	65	Not limited		Not limited		Somewhat limited: Slope	0.96
McConaughy, moderately eroded--	25	Not limited		Not limited		Somewhat limited: Slope	0.96
7122: Sulco, moderately eroded-----	70	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00
McConaughy, moderately eroded--	20	Somewhat limited: Slope	0.63	Somewhat limited: Slope	0.63	Very limited: Slope	1.00
7582: Valent-----	90	Not limited		Not limited		Somewhat limited: Slope	0.47
7586: Valent-----	95	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00
7588: Valent, rolling----	50	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00
Valent, hilly-----	45	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00

Table 13b.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Somewhat limited: Frost action	0.50	Very limited: Cutbanks cave	1.00	Not limited	
1146: Alliance-----	65	Somewhat limited: Frost action	0.50	Somewhat limited: Cutbanks cave	0.10	Not limited	
Rosebud-----	25	Somewhat limited: Frost action	0.50	Somewhat limited: Depth to soft bedrock Cutbanks cave	0.42 0.10	Somewhat limited: Depth to bedrock	0.42
1198: Altvan-----	45	Somewhat limited: Frost action	0.50	Very limited: Cutbanks cave	1.00	Not limited	
Eckley-----	30	Not limited		Very limited: Cutbanks cave	1.00	Somewhat limited: Droughty	0.89
Satanta, sandy substratum-----	20	Somewhat limited: Frost action	0.50	Very limited: Cutbanks cave	1.00	Not limited	
1295: Ashollow-----	65	Somewhat limited: Slope	0.84	Somewhat limited: Slope Cutbanks cave	0.84 0.10	Somewhat limited: Slope	0.84
Tassel-----	30	Very limited: Slope Depth to soft bedrock	1.00 1.00	Very limited: Depth to soft bedrock Slope Cutbanks cave	1.00 1.00 0.10	Very limited: Depth to bedrock Droughty Slope	1.00 1.00 1.00
1588: Blueridge-----	50	Very limited: Slope	1.00	Very limited: Cutbanks cave Slope	1.00 1.00	Very limited: Too sandy Droughty Slope Gravel content	1.00 1.00 1.00 0.03
Altvan-----	35	Somewhat limited: Frost action	0.50	Very limited: Cutbanks cave	1.00	Not limited	
1782: Broadwater, frequently flooded-	90	Very limited: Flooding	1.00	Very limited: Cutbanks cave Flooding	1.00 0.80	Very limited: Flooding Droughty	1.00 1.00

Table 13b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1944: Calamus, very rarely flooded-----	95	Somewhat limited: Flooding	0.20	Very limited: Cutbanks cave Depth to saturated zone	1.00 0.35	Somewhat limited: Droughty	0.75
2072: Chappell-----	38	Not limited		Very limited: Cutbanks cave	1.00	Not limited	
Alice-----	33	Somewhat limited: Frost action	0.50	Somewhat limited: Cutbanks cave	0.10	Not limited	
Broadwater-----	24	Very limited: Flooding	1.00	Very limited: Cutbanks cave Flooding	1.00 0.60	Very limited: Droughty Flooding	1.00 0.60
2630: Duroc-----	90	Not limited		Somewhat limited: Cutbanks cave	0.10	Not limited	
2638: Duroc-----	90	Not limited		Somewhat limited: Cutbanks cave	0.10	Not limited	
2639: Duroc-----	90	Not limited		Somewhat limited: Cutbanks cave	0.10	Not limited	
3050: Glenberg, rarely flooded-----	90	Somewhat limited: Frost action Flooding	0.50 0.40	Very limited: Cutbanks cave	1.00	Not limited	
3140: Gothenburg, occasionally flooded-----	85	Very limited: Flooding Depth to saturated zone Frost action	1.00 1.00 0.50	Very limited: Depth to saturated zone Cutbanks cave Flooding	1.00 1.00 0.60	Very limited: Droughty Depth to saturated zone Flooding	1.00 1.00 0.60
3952: Jankosh-----	85	Somewhat limited: Frost action Flooding Depth to saturated zone	0.50 0.40 0.03	Very limited: Cutbanks cave Depth to saturated zone	1.00 1.00	Very limited: Sodium content Salinity Depth to saturated zone	1.00 1.00 0.03
4028: Jayem-----	90	Not limited		Somewhat limited: Cutbanks cave	0.10	Not limited	

Table 13b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4070: Johnstown-----	35	Very limited: Low strength Shrink-swell Frost action	 1.00 0.50 0.50	Very limited: Cutbanks cave	 1.00	Not limited	
Satanta, sandy substratum-----	31	Very limited: Low strength Shrink-swell Frost action	 1.00 0.50 0.50	Very limited: Cutbanks cave	 1.00	Not limited	
Richfield-----	29	Somewhat limited: Low strength	 0.22	Somewhat limited: Too clayey Cutbanks cave	 0.12 0.10	Not limited	
4151: Keith-----	90	Very limited: Low strength Shrink-swell Frost action	 1.00 0.50 0.50	Somewhat limited: Cutbanks cave	 0.10	Not limited	
4152: Keith-----	90	Somewhat limited: Frost action	 0.50	Somewhat limited: Cutbanks cave	 0.10	Not limited	
4310: Kuma-----	95	Somewhat limited: Frost action	 0.50	Somewhat limited: Cutbanks cave	 0.10	Not limited	
4311: Kuma-----	90	Very limited: Low strength Shrink-swell Frost action	 1.00 0.50 0.50	Somewhat limited: Cutbanks cave	 0.10	Not limited	
4472: Las Animas, frequently flooded-	95	Very limited: Frost action Flooding Depth to saturated zone	 1.00 1.00 1.00	Very limited: Depth to saturated zone Cutbanks cave Flooding	 1.00 1.00 0.80	Very limited: Flooding Depth to saturated zone	 1.00 1.00
4475: Las Animas, occasionally flooded-----	92	Very limited: Frost action Flooding Depth to saturated zone	 1.00 1.00 0.03	Very limited: Cutbanks cave Depth to saturated zone Flooding	 1.00 1.00 0.60	Somewhat limited: Flooding Depth to saturated zone	 0.60 0.03
4592: Lexsworth, very rarely flooded----	85	Very limited: Frost action Flooding	 1.00 0.20	Very limited: Cutbanks cave	 1.00	Not limited	

Table 13b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4655: Lodgepole, ponded---	95	Very limited: Ponding Depth to saturated zone Frost action Low strength Shrink-swell	 1.00 1.00 1.00 1.00 1.00	Very limited: Ponding Depth to saturated zone Too clayey Cutbanks cave	 1.00 1.00 0.12 0.10	Very limited: Ponding Depth to saturated zone	 1.00 1.00
5212: Merrick, very rarely flooded-----	90	Very limited: Low strength Shrink-swell Frost action Flooding	 1.00 0.50 0.50 0.20	Somewhat limited: Depth to saturated zone Cutbanks cave	 0.15 0.10	Not limited	
6132: Platte, occasionally flooded-----	90	Very limited: Flooding Frost action Depth to saturated zone	 1.00 0.50 0.19	Very limited: Cutbanks cave Depth to saturated zone Flooding	 1.00 1.00 0.60	Somewhat limited: Flooding Depth to saturated zone Droughty	 0.60 0.19 0.05
6248: Ralton, very rarely flooded-----	90	Somewhat limited: Frost action Flooding	 0.50 0.20	Somewhat limited: Depth to saturated zone Cutbanks cave	 0.35 0.10	Not limited	
6625: Sarben-----	90	Not limited		Somewhat limited: Cutbanks cave	 0.10	Somewhat limited: Droughty	 0.01
6626: Sarben-----	90	Not limited		Somewhat limited: Cutbanks cave	 0.10	Somewhat limited: Droughty	 0.01
6722: Satanta-----	65	Somewhat limited: Frost action	 0.50	Very limited: Cutbanks cave	 1.00	Not limited	
Altvan-----	25	Somewhat limited: Frost action	 0.50	Very limited: Cutbanks cave	 1.00	Not limited	
6725: Satanta, sandy substratum-----	45	Very limited: Low strength Shrink-swell Frost action	 1.00 0.50 0.50	Very limited: Cutbanks cave	 1.00	Not limited	
Ascalon-----	45	Somewhat limited: Frost action	 0.50	Very limited: Cutbanks cave	 1.00	Not limited	

Table 13b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6727: Satanta, sandy substratum-----	60	Very limited: Low strength Shrink-swell Frost action	1.00 0.50 0.50	Very limited: Cutbanks cave	1.00	Not limited	
Johnstown-----	18	Very limited: Low strength Shrink-swell Frost action	1.00 0.50 0.50	Very limited: Cutbanks cave	1.00	Not limited	
Altvan-----	15	Somewhat limited: Frost action	0.50	Very limited: Cutbanks cave	1.00	Not limited	
6817: Scoville-----	95	Not limited		Very limited: Cutbanks cave	1.00	Somewhat limited: Droughty	0.61
6930: Sidney-----	85	Somewhat limited: Frost action	0.50	Somewhat limited: Cutbanks cave	0.10	Not limited	
6937: Sidney-----	65	Somewhat limited: Frost action	0.50	Somewhat limited: Cutbanks cave	0.10	Not limited	
Canyon-----	25	Somewhat limited: Depth to soft bedrock	1.00	Very limited: Depth to soft bedrock Cutbanks cave	1.00 0.10	Very limited: Droughty Depth to bedrock	1.00 1.00
7120: Sulco, moderately eroded-----	55	Not limited		Somewhat limited: Cutbanks cave	0.10	Not limited	
McConaughy, moderately eroded--	30	Somewhat limited: Frost action	0.50	Somewhat limited: Cutbanks cave	0.10	Not limited	
7121: Sulco, moderately eroded-----	65	Not limited		Somewhat limited: Cutbanks cave	0.10	Not limited	
McConaughy, moderately eroded--	25	Somewhat limited: Frost action	0.50	Somewhat limited: Cutbanks cave	0.10	Not limited	
7122: Sulco, moderately eroded-----	70	Very limited: Slope	1.00	Very limited: Slope Cutbanks cave	1.00 0.10	Very limited: Slope	1.00
McConaughy, moderately eroded--	20	Somewhat limited: Slope Frost action	0.63 0.50	Somewhat limited: Slope Cutbanks cave	0.63 0.10	Somewhat limited: Slope	0.63

Table 13b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7582: Valent-----	90	Not limited		Very limited: Cutbanks cave	1.00	Somewhat limited: Droughty	0.89
7586: Valent-----	95	Very limited: Slope	1.00	Very limited: Cutbanks cave Slope	1.00 1.00	Very limited: Slope Droughty	1.00 0.89
7588: Valent, rolling-----	50	Very limited: Slope	1.00	Very limited: Cutbanks cave Slope	1.00 1.00	Very limited: Slope Droughty	1.00 0.89
Valent, hilly-----	45	Very limited: Slope	1.00	Very limited: Slope Cutbanks cave	1.00 1.00	Very limited: Slope Droughty	1.00 0.89

Table 14a.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Very limited: Filtering capacity Depth to bedrock Restricted permeability	  1.00 0.59  0.50	Very limited: Seepage Depth to soft bedrock	 1.00  0.13
1146: Alliance-----	65	Somewhat limited: Depth to bedrock Restricted permeability	 0.78  0.50	Somewhat limited: Seepage Depth to soft bedrock Slope	 0.53  0.42 0.01
Rosebud-----	25	Very limited: Depth to bedrock Restricted permeability	 1.00  0.46	Very limited: Depth to soft bedrock Seepage Slope	 1.00  0.53 0.01
1198: Altvan-----	45	Very limited: Filtering capacity Restricted permeability	 1.00  0.46	Very limited: Seepage Slope	 1.00 0.91
Eckley-----	30	Very limited: Filtering capacity	 1.00	Very limited: Seepage Slope	 1.00 0.91
Satanta, sandy substratum-----	20	Very limited: Filtering capacity Restricted permeability	 1.00  1.00	Very limited: Seepage Slope	 1.00 0.91
1295: Ashollow-----	65	Somewhat limited: Slope Restricted permeability	 0.84  0.50	Very limited: Slope Seepage	 1.00 0.50
Tassel-----	30	Very limited: Depth to bedrock Slope	 1.00 1.00	Very limited: Depth to soft bedrock Slope Seepage	  1.00 1.00 1.00

Table 14a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1588: Blueridge-----	50	Very limited: Filtering capacity Slope	 1.00 1.00	Very limited: Seepage Slope	 1.00 1.00
Altvan-----	35	Very limited: Filtering capacity Restricted permeability	 1.00 0.46	Very limited: Seepage Slope	 1.00 1.00
1782: Broadwater, frequently flooded-	90	Very limited: Flooding Filtering capacity	 1.00 1.00	Very limited: Flooding Seepage	 1.00 1.00
1944: Calamus, very rarely flooded-----	95	Very limited: Filtering capacity Depth to saturated zone Flooding	 1.00 0.84 0.20	Very limited: Seepage Flooding Depth to saturated zone	 1.00 0.20 0.17
2072: Chappell-----	38	Very limited: Filtering capacity	 1.00	Very limited: Seepage	 1.00
Alice-----	33	Not limited		Very limited: Seepage	 1.00
Broadwater-----	24	Very limited: Flooding Filtering capacity	 1.00 1.00	Very limited: Flooding Seepage	 1.00 1.00
2630: Duroc-----	90	Somewhat limited: Restricted permeability	 0.50	Somewhat limited: Seepage	 0.50
2638: Duroc-----	90	Somewhat limited: Restricted permeability	 0.50	Somewhat limited: Seepage	 0.50
2639: Duroc-----	90	Somewhat limited: Restricted permeability	 0.50	Somewhat limited: Seepage	 0.50

Table 14a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
3050: Glenberg, rarely flooded-----	90	Somewhat limited: Flooding	0.40	Very limited: Seepage Flooding	1.00 0.40
3140: Gothenburg, occasionally flooded-----	85	Very limited: Flooding Depth to saturated zone Filtering capacity	1.00 1.00 1.00	Very limited: Flooding Seepage Depth to saturated zone	1.00 1.00 1.00
3952: Jankosh-----	85	Very limited: Depth to saturated zone Filtering capacity Restricted permeability Flooding	1.00 1.00 0.50 0.40	Very limited: Seepage Depth to saturated zone Flooding	1.00 1.00 0.40
4028: Jayem-----	90	Not limited		Very limited: Seepage	1.00
4070: Johnstown-----	35	Very limited: Filtering capacity Restricted permeability	1.00 1.00	Very limited: Seepage	1.00
Satanta, sandy substratum-----	31	Very limited: Filtering capacity Restricted permeability	1.00 1.00	Very limited: Seepage	1.00
Richfield-----	29	Very limited: Filtering capacity Restricted permeability	1.00 0.50	Very limited: Seepage	1.00
4151: Keith-----	90	Somewhat limited: Restricted permeability	0.50	Somewhat limited: Seepage Slope	0.53 0.01
4152: Keith-----	90	Somewhat limited: Restricted permeability	0.50	Somewhat limited: Slope Seepage	0.50 0.50

Table 14a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
4310: Kuma-----	95	Somewhat limited: Restricted permeability	0.50	Somewhat limited: Seepage	0.50
4311: Kuma-----	90	Very limited: Restricted permeability	1.00	Somewhat limited: Seepage Slope	0.50 0.01
4472: Las Animas, frequently flooded-	95	Very limited: Flooding Depth to saturated zone Filtering capacity	1.00 1.00 1.00	Very limited: Flooding Seepage Depth to saturated zone	1.00 1.00 1.00
4475: Las Animas, occasionally flooded-----	92	Very limited: Flooding Depth to saturated zone Filtering capacity	1.00 1.00 1.00	Very limited: Flooding Seepage Depth to saturated zone	1.00 1.00 1.00
4592: Lexsworth, very rarely flooded----	85	Very limited: Filtering capacity Flooding	1.00 0.20	Very limited: Seepage Flooding	1.00 0.20
4655: Lodgepole, ponded---	95	Very limited: Restricted permeability Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited: Ponding Depth to saturated zone Seepage	1.00 1.00 0.50
5212: Merrick, very rarely flooded-----	90	Very limited: Restricted permeability Depth to saturated zone Flooding	1.00 0.40 0.20	Somewhat limited: Seepage Flooding	0.50 0.20

Table 14a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6132: Platte, occasionally flooded-----	90	Very limited: Flooding Depth to saturated zone Filtering capacity	1.00  1.00 1.00	Very limited: Flooding Seepage Depth to saturated zone	1.00 1.00 1.00
6248: Ralton, very rarely flooded-----	90	Very limited: Filtering capacity Depth to saturated zone Restricted permeability Flooding	1.00  0.84 0.50 0.20	Very limited: Seepage Flooding Depth to saturated zone	1.00 0.20 0.17
6625: Sarben-----	90	Not limited		Very limited: Seepage Slope	1.00 0.01
6626: Sarben-----	90	Not limited		Very limited: Seepage Slope	1.00 0.50
6722: Satanta-----	65	Very limited: Filtering capacity Restricted permeability	1.00  0.48	Very limited: Seepage Slope	1.00 0.50
Altvan-----	25	Very limited: Filtering capacity Restricted permeability	1.00  0.50	Very limited: Seepage Slope	1.00 0.50
6725: Satanta, sandy substratum-----	45	Very limited: Filtering capacity Restricted permeability	1.00  1.00	Very limited: Seepage	1.00
Ascalon-----	45	Very limited: Filtering capacity	1.00	Very limited: Seepage	1.00

Table 14a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6727: Satanta, sandy substratum-----	60	Very limited: Filtering capacity Restricted permeability	1.00 1.00	Very limited: Seepage Slope	1.00 0.01
Johnstown-----	18	Very limited: Filtering capacity Restricted permeability	1.00 1.00	Very limited: Seepage Slope	1.00 0.01
Altvan-----	15	Very limited: Filtering capacity Restricted permeability	1.00 0.50	Very limited: Seepage Slope	1.00 0.01
6817: Scoville-----	95	Very limited: Filtering capacity Restricted permeability	1.00 0.48	Very limited: Seepage	1.00
6930: Sidney-----	85	Somewhat limited: Depth to bedrock Restricted permeability	0.78 0.46	Somewhat limited: Seepage Slope Depth to soft bedrock	0.53 0.50 0.42
6937: Sidney-----	65	Somewhat limited: Depth to bedrock Restricted permeability	0.78 0.46	Very limited: Slope Seepage Depth to soft bedrock	1.00 0.53 0.42
Canyon-----	25	Very limited: Depth to bedrock	1.00	Very limited: Depth to soft bedrock Slope	1.00 1.00
7120: Sulco, moderately eroded-----	55	Somewhat limited: Restricted permeability	0.50	Somewhat limited: Slope Seepage	0.67 0.50
McConaughy, moderately eroded--	30	Somewhat limited: Restricted permeability	0.50	Somewhat limited: Seepage Slope	0.50 0.33

Table 14a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
7121: Sulco, moderately eroded-----	65	Somewhat limited: Restricted permeability	0.50	Very limited: Slope Seepage	1.00 0.50
McConaughy, moderately eroded--	25	Somewhat limited: Restricted permeability	0.50	Very limited: Slope Seepage	1.00 0.50
7122: Sulco, moderately eroded-----	70	Very limited: Slope Restricted permeability	1.00 0.50	Very limited: Slope Seepage	1.00 0.50
McConaughy, moderately eroded--	20	Somewhat limited: Slope Restricted permeability	0.63 0.50	Very limited: Slope Seepage	1.00 0.50
7582: Valent-----	90	Very limited: Filtering capacity	1.00	Very limited: Seepage Slope	1.00 0.91
7586: Valent-----	95	Very limited: Filtering capacity Slope	1.00 1.00	Very limited: Slope Seepage	1.00 1.00
7588: Valent, rolling-----	50	Very limited: Filtering capacity Slope	1.00 1.00	Very limited: Slope Seepage	1.00 1.00
Valent, hilly-----	45	Very limited: Filtering capacity Slope	1.00 1.00	Very limited: Slope Seepage	1.00 1.00

Table 14b.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Very limited: Depth to bedrock	1.00	Not limited		Somewhat limited: Depth to bedrock	0.13
1146: Alliance-----	65	Very limited: Depth to bedrock	1.00	Not limited		Somewhat limited: Depth to bedrock	0.42
Rosebud-----	25	Very limited: Depth to bedrock	1.00	Very limited: Depth to bedrock	1.00	Very limited: Depth to bedrock	1.00
1198: Altvan-----	45	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
Eckley-----	30	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
Satanta, sandy substratum-----	20	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
1295: Ashollow-----	65	Somewhat limited: Slope	0.84	Somewhat limited: Slope	0.84	Somewhat limited: Slope	0.84
Tassel-----	30	Very limited: Depth to bedrock Slope	1.00 1.00	Very limited: Slope	1.00	Very limited: Depth to bedrock Slope Seepage	1.00 1.00 0.50
1588: Blueridge-----	50	Very limited: Too sandy Slope	1.00 1.00	Very limited: Slope	1.00	Very limited: Too sandy Seepage Slope Gravel content	1.00 1.00 1.00 0.01
Altvan-----	35	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
1782: Broadwater, frequently flooded-	90	Very limited: Flooding Too sandy	1.00 1.00	Very limited: Flooding	1.00	Very limited: Too sandy Seepage	1.00 1.00

Table 14b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1944: Calamus, very rarely flooded-----	95	Very limited: Seepage Too sandy Depth to saturated zone Flooding	1.00 1.00 1.00 0.20	Very limited: Seepage Depth to saturated zone Flooding	1.00 1.00 0.20	Very limited: Too sandy Seepage	1.00 1.00
2072: Chappell-----	38	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
Alice-----	33	Not limited		Not limited		Somewhat limited: Seepage	0.50
Broadwater-----	24	Very limited: Flooding Too sandy	1.00 1.00	Very limited: Flooding	1.00	Very limited: Too sandy Seepage	1.00 1.00
2630: Duroc-----	90	Not limited		Not limited		Not limited	
2638: Duroc-----	90	Not limited		Not limited		Not limited	
2639: Duroc-----	90	Not limited		Not limited		Not limited	
3050: Glenberg, rarely flooded-----	90	Very limited: Too sandy Flooding	1.00 0.40	Somewhat limited: Flooding	0.40	Somewhat limited: Seepage Too sandy	0.50 0.50
3140: Gothenburg, occasionally flooded-----	85	Very limited: Flooding Depth to saturated zone Seepage Too sandy	1.00 1.00 1.00 1.00	Very limited: Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited: Too sandy Seepage Depth to saturated zone	1.00 1.00 1.00
3952: Jankosh-----	85	Very limited: Depth to saturated zone Seepage Too sandy Sodium content Flooding	1.00 1.00 1.00 1.00 0.40	Very limited: Depth to saturated zone Seepage Flooding	1.00 1.00 0.40	Very limited: Too sandy Seepage Sodium content Depth to saturated zone	1.00 1.00 1.00 0.68
4028: Jayem-----	90	Not limited		Not limited		Somewhat limited: Seepage	0.50

Table 14b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4070: Johnstown-----	35	Very limited: Seepage Too clayey	1.00 0.50	Not limited		Somewhat limited: Too clayey	0.50
Satanta, sandy substratum-----	31	Not limited		Not limited		Not limited	
Richfield-----	29	Not limited		Not limited		Somewhat limited: Seepage	0.50
4151: Keith-----	90	Not limited		Not limited		Not limited	
4152: Keith-----	90	Not limited		Not limited		Not limited	
4310: Kuma-----	95	Not limited		Not limited		Not limited	
4311: Kuma-----	90	Not limited		Not limited		Not limited	
4472: Las Animas, frequently flooded-	95	Very limited: Flooding Depth to saturated zone Seepage Too sandy	1.00 1.00 1.00 1.00	Very limited: Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited: Seepage Depth to saturated zone Too sandy	1.00 1.00 0.50
4475: Las Animas, occasionally flooded-----	92	Very limited: Flooding Depth to saturated zone Seepage Too sandy	1.00 1.00 1.00 1.00	Very limited: Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited: Seepage Depth to saturated zone Too sandy	1.00 0.68 0.50
4592: Lexsworth, very rarely flooded----	85	Very limited: Too sandy Flooding	1.00 0.20	Somewhat limited: Flooding	0.20	Very limited: Too sandy Seepage	1.00 1.00
4655: Lodgepole, ponded---	95	Very limited: Depth to saturated zone Ponding	1.00 1.00	Very limited: Ponding Depth to saturated zone	1.00 1.00	Very limited: Ponding Depth to saturated zone	1.00 1.00

Table 14b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5212: Merrick, very rarely flooded-----	90	Very limited: Depth to saturated zone Too clayey Flooding	1.00 0.50 0.20	Very limited: Depth to saturated zone Flooding	1.00 0.20	Somewhat limited: Too clayey	0.50
6132: Platte, occasionally flooded-----	90	Very limited: Flooding Depth to saturated zone Seepage Too sandy	1.00 1.00 1.00 1.00	Very limited: Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited: Too sandy Seepage Depth to saturated zone	1.00 1.00 0.86
6248: Ralton, very rarely flooded-----	90	Very limited: Seepage Depth to saturated zone Flooding	1.00 1.00 0.20	Very limited: Depth to saturated zone Flooding	1.00 0.20	Somewhat limited: Seepage	0.50
6625: Sarben-----	90	Not limited		Not limited		Somewhat limited: Seepage	0.50
6626: Sarben-----	90	Not limited		Not limited		Somewhat limited: Seepage	0.50
6722: Satanta-----	65	Not limited		Not limited		Not limited	
Altvan-----	25	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
6725: Satanta, sandy substratum-----	45	Not limited		Not limited		Not limited	
Ascalon-----	45	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
6727: Satanta, sandy substratum-----	60	Not limited		Not limited		Not limited	
Johnstown-----	18	Very limited: Seepage Too clayey	1.00 0.50	Not limited		Somewhat limited: Too clayey	0.50
Altvan-----	15	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00

Table 14b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6817: Scoville-----	95	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
6930: Sidney-----	85	Very limited: Depth to bedrock	1.00	Not limited		Somewhat limited: Depth to bedrock	0.42
6937: Sidney-----	65	Very limited: Depth to bedrock	1.00	Not limited		Somewhat limited: Depth to bedrock	0.42
Canyon-----	25	Very limited: Depth to bedrock	1.00	Not limited		Very limited: Depth to bedrock	1.00
7120: Sulco, moderately eroded-----	55	Not limited		Not limited		Not limited	
McConaughy, moderately eroded--	30	Not limited		Not limited		Not limited	
7121: Sulco, moderately eroded-----	65	Not limited		Not limited		Not limited	
McConaughy, moderately eroded--	25	Not limited		Not limited		Not limited	
7122: Sulco, moderately eroded-----	70	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00
McConaughy, moderately eroded--	20	Somewhat limited: Slope	0.63	Somewhat limited: Slope	0.63	Somewhat limited: Slope	0.63
7582: Valent-----	90	Very limited: Too sandy	1.00	Not limited		Very limited: Too sandy Seepage	1.00 1.00
7586: Valent-----	95	Very limited: Too sandy Slope	1.00 1.00	Very limited: Slope	1.00	Very limited: Too sandy Seepage Slope	1.00 1.00 1.00
7588: Valent, rolling----	50	Very limited: Too sandy Slope	1.00 1.00	Very limited: Slope	1.00	Very limited: Too sandy Seepage Slope	1.00 1.00 1.00

Table 14b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7588: Valent, hilly-----	45	Very limited: Slope Too sandy	1.00 1.00	Very limited: Slope	1.00	Very limited: Slope Too sandy Seepage	1.00 1.00 1.00

Table 15a.--Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Very limited: Filtering capacity Restricted permeability	1.00  0.30	Very limited: Filtering capacity Restricted permeability	1.00  0.22	Very limited: Filtering capacity Restricted permeability	1.00  0.22
1146: Alliance-----	65	Somewhat limited: Restricted permeability	0.30	Somewhat limited: Restricted permeability	0.22	Somewhat limited: Restricted permeability	0.22
Rosebud-----	25	Somewhat limited: Depth to bedrock Restricted permeability Droughty	0.42  0.30 0.08	Somewhat limited: Depth to bedrock Restricted permeability Droughty	0.42  0.22 0.08	Somewhat limited: Depth to bedrock Restricted permeability Droughty	0.42  0.22 0.08
1198: Altvan-----	45	Very limited: Filtering capacity Restricted permeability	1.00  0.30	Very limited: Filtering capacity Restricted permeability	1.00  0.22	Very limited: Filtering capacity Too steep for surface application Restricted permeability	1.00   0.66 0.22
Eckley-----	30	Very limited: Filtering capacity Droughty Restricted permeability	1.00  0.96 0.41	Very limited: Filtering capacity Droughty Restricted permeability	1.00  0.96 0.31	Very limited: Filtering capacity Droughty Too steep for surface application Restricted permeability	1.00  0.96  0.66 0.31
Satanta, sandy substratum-----	20	Very limited: Filtering capacity Restricted permeability	1.00  0.41	Very limited: Filtering capacity Restricted permeability	1.00  0.31	Very limited: Filtering capacity Too steep for surface application Restricted permeability	1.00   0.66 0.31

Table 15a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1295: Ashollow-----	65	Somewhat limited: Slope	0.84	Somewhat limited: Slope	0.84	Very limited: Too steep for surface application Too steep for sprinkler application	1.00  0.89
Tassel-----	30	Very limited: Droughty Depth to bedrock Slope Runoff Filtering capacity	1.00 1.00 1.00 0.40 0.01	Very limited: Droughty Depth to bedrock Slope Filtering capacity	1.00 1.00 1.00 0.01	Very limited: Droughty Too steep for surface application Depth to bedrock Too steep for sprinkler application Filtering capacity	1.00  1.00 1.00 1.00 1.00 0.01
1588: Blueridge-----	50	Very limited: Filtering capacity Low adsorption Droughty Slope Leaching	1.00 1.00 1.00 1.00 0.45	Very limited: Droughty Filtering capacity Slope	1.00 1.00 1.00	Very limited: Droughty Filtering capacity Low adsorption Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 1.00 1.00
Altvan-----	35	Very limited: Filtering capacity Restricted permeability	1.00 0.30	Very limited: Filtering capacity Restricted permeability	1.00 0.22	Very limited: Filtering capacity Too steep for surface application Restricted permeability Too steep for sprinkler application	1.00  1.00 0.22 0.10
1782: Broadwater, frequently flooded-	90	Very limited: Filtering capacity Flooding Droughty Low adsorption Leaching	1.00 1.00 1.00 0.93 0.45	Very limited: Filtering capacity Flooding Droughty	1.00 1.00 1.00	Very limited: Filtering capacity Flooding Droughty Low adsorption	1.00 1.00 1.00 0.93

Table 15a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1944: Calamus, very rarely flooded-----	95	Very limited: Filtering capacity Droughty Leaching Flooding	1.00 0.97 0.45 0.20	Very limited: Filtering capacity Droughty Flooding	1.00 0.97 0.20	Very limited: Filtering capacity Droughty	1.00 0.97
2072: Chappell-----	38	Very limited: Filtering capacity Leaching Droughty	1.00 0.45 0.08	Very limited: Filtering capacity Droughty	1.00 0.08	Very limited: Filtering capacity Droughty	1.00 0.08
Alice-----	33	Somewhat limited: Filtering capacity	0.01	Somewhat limited: Filtering capacity	0.01	Somewhat limited: Filtering capacity	0.01
Broadwater-----	24	Very limited: Filtering capacity Flooding Droughty Low adsorption Leaching	1.00 1.00 1.00 0.93 0.45	Very limited: Filtering capacity Flooding Droughty	1.00 1.00 1.00	Very limited: Filtering capacity Droughty Low adsorption Flooding	1.00 1.00 0.93 0.60
2630: Duroc-----	90	Not limited		Not limited		Not limited	
2638: Duroc-----	90	Not limited		Not limited		Not limited	
2639: Duroc-----	90	Not limited		Not limited		Not limited	
3050: Glenberg, rarely flooded-----	90	Somewhat limited: Flooding Filtering capacity	0.40 0.01	Somewhat limited: Flooding Filtering capacity	0.40 0.01	Somewhat limited: Filtering capacity	0.01
3140: Gothenburg, occasionally flooded-----	85	Very limited: Filtering capacity Depth to saturated zone Flooding Low adsorption Droughty	1.00 1.00 1.00 1.00 1.00	Very limited: Filtering capacity Depth to saturated zone Flooding Droughty Low adsorption	1.00 1.00 1.00 1.00 0.08	Very limited: Filtering capacity Depth to saturated zone Low adsorption Droughty Flooding	1.00 1.00 1.00 1.00 0.60

Table 15a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
3952: Jankosh-----	85	Very limited: Filtering capacity Sodium content Depth to saturated zone Salinity Flooding	1.00 1.00 0.95 0.50 0.40	Very limited: Filtering capacity Sodium content Salinity Depth to saturated zone Flooding	1.00 1.00 1.00 0.95 0.40	Very limited: Filtering capacity Sodium content Salinity Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.95 0.22
4028: Jayem-----	90	Somewhat limited: Filtering capacity	0.01	Somewhat limited: Filtering capacity	0.01	Somewhat limited: Filtering capacity	0.01
4070: Johnstown-----	35	Very limited: Filtering capacity Restricted permeability	1.00 0.41	Very limited: Filtering capacity Restricted permeability	1.00 0.31	Very limited: Filtering capacity Restricted permeability	1.00 0.31
Satanta, sandy substratum-----	31	Very limited: Filtering capacity Restricted permeability	1.00 0.41	Very limited: Filtering capacity Restricted permeability	1.00 0.31	Very limited: Filtering capacity Restricted permeability	1.00 0.31
Richfield-----	29	Very limited: Restricted permeability Filtering capacity	1.00 0.01	Very limited: Restricted permeability Filtering capacity	1.00 0.01	Very limited: Restricted permeability Filtering capacity	1.00 0.01
4151: Keith-----	90	Somewhat limited: Restricted permeability	0.41	Somewhat limited: Restricted permeability	0.31	Somewhat limited: Restricted permeability	0.31
4152: Keith-----	90	Somewhat limited: Restricted permeability	0.41	Somewhat limited: Restricted permeability	0.31	Somewhat limited: Restricted permeability Too steep for surface application	0.31 0.17
4310: Kuma-----	95	Not limited		Not limited		Not limited	
4311: Kuma-----	90	Somewhat limited: Restricted permeability	0.41	Somewhat limited: Restricted permeability	0.31	Somewhat limited: Restricted permeability	0.31

Table 15a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4472: Las Animas, frequently flooded-	95	Very limited: Filtering capacity Depth to saturated zone Flooding Runoff	1.00  1.00 1.00 0.40	Very limited: Filtering capacity Depth to saturated zone Flooding	1.00  1.00 1.00	Very limited: Filtering capacity Depth to saturated zone Flooding	1.00  1.00 1.00
4475: Las Animas, occasionally flooded-----	92	Very limited: Filtering capacity Flooding Depth to saturated zone Runoff	1.00 1.00 0.95 0.40	Very limited: Filtering capacity Flooding Depth to saturated zone	1.00 1.00 0.95	Very limited: Filtering capacity Depth to saturated zone Flooding	1.00  0.95 0.60
4592: Lexsworth, very rarely flooded----	85	Very limited: Filtering capacity Restricted permeability Flooding Sodium content Salinity	1.00  0.41 0.20 0.02 0.01	Very limited: Filtering capacity Restricted permeability Flooding Sodium content Droughty	1.00  0.31 0.20 0.02 0.01	Very limited: Filtering capacity Restricted permeability Sodium content Droughty	1.00  0.31 0.02 0.01
4655: Lodgepole, ponded---	95	Very limited: Restricted permeability Ponding Depth to saturated zone Runoff	1.00 1.00 1.00 0.40	Very limited: Restricted permeability Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited: Restricted permeability Ponding Depth to saturated zone	1.00 1.00 1.00
5212: Merrick, very rarely flooded-----	90	Somewhat limited: Restricted permeability Flooding	0.41 0.20	Somewhat limited: Restricted permeability Flooding	0.31 0.20	Somewhat limited: Restricted permeability	0.31
6132: Platte, occasionally flooded-----	90	Very limited: Filtering capacity Flooding Depth to saturated zone Droughty	1.00 1.00 1.00 0.61	Very limited: Filtering capacity Flooding Depth to saturated zone Droughty	1.00 1.00 1.00 0.61	Very limited: Filtering capacity Depth to saturated zone Droughty Flooding	1.00  1.00 0.61 0.60

Table 15a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6248: Ralton, very rarely flooded-----	90	Somewhat limited: Flooding Filtering capacity	0.20 0.01	Somewhat limited: Flooding Filtering capacity	0.20 0.01	Somewhat limited: Filtering capacity	0.01
6625: Sarben-----	90	Very limited: Filtering capacity Droughty	1.00 0.01	Very limited: Filtering capacity Droughty	1.00 0.01	Very limited: Filtering capacity Droughty	1.00 0.01
6626: Sarben-----	90	Very limited: Filtering capacity Droughty	1.00 0.01	Very limited: Filtering capacity Droughty	1.00 0.01	Very limited: Filtering capacity Too steep for surface application Droughty	1.00 0.17 0.01
6722: Satanta-----	65	Very limited: Filtering capacity Restricted permeability	1.00 0.41	Very limited: Filtering capacity Restricted permeability	1.00 0.31	Very limited: Filtering capacity Restricted permeability Too steep for surface application	1.00 0.31 0.17
Altvan-----	25	Very limited: Filtering capacity Restricted permeability	1.00 0.30	Very limited: Filtering capacity Restricted permeability	1.00 0.22	Very limited: Filtering capacity Restricted permeability Too steep for surface application	1.00 0.22 0.17
6725: Satanta, sandy substratum-----	45	Very limited: Filtering capacity Restricted permeability	1.00 0.41	Very limited: Filtering capacity Restricted permeability	1.00 0.31	Very limited: Filtering capacity Restricted permeability	1.00 0.31
Ascalon-----	45	Very limited: Filtering capacity Restricted permeability	1.00 0.41	Very limited: Filtering capacity Restricted permeability	1.00 0.31	Very limited: Filtering capacity Restricted permeability	1.00 0.31

Table 15a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6727: Satanta, sandy substratum-----	60	Very limited: Filtering capacity Restricted permeability	1.00  0.41	Very limited: Filtering capacity Restricted permeability	1.00  0.31	Very limited: Filtering capacity Restricted permeability	1.00  0.31
Johnstown-----	18	Very limited: Filtering capacity Restricted permeability	1.00  0.41	Very limited: Filtering capacity Restricted permeability	1.00  0.31	Very limited: Filtering capacity Restricted permeability	1.00  0.31
Altvan-----	15	Very limited: Filtering capacity Restricted permeability	1.00  0.30	Very limited: Filtering capacity Restricted permeability	1.00  0.22	Very limited: Filtering capacity Restricted permeability	1.00  0.22
6817: Scoville-----	95	Very limited: Filtering capacity Depth to dense layer Leaching Droughty	1.00  1.00 0.45 0.22	Very limited: Filtering capacity Droughty	1.00  0.22	Very limited: Filtering capacity Droughty	1.00  0.22
6930: Sidney-----	85	Not limited		Not limited		Somewhat limited: Too steep for surface application	0.17
6937: Sidney-----	65	Not limited		Not limited		Somewhat limited: Too steep for surface application Too steep for sprinkler application	0.97  0.05
Canyon-----	25	Very limited: Droughty Depth to bedrock Runoff Low adsorption	1.00 1.00 0.40 0.14	Very limited: Droughty Depth to bedrock	1.00 1.00	Very limited: Droughty Depth to bedrock Too steep for surface application Low adsorption Too steep for sprinkler application	1.00 1.00  0.97 0.14  0.05

Table 15a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7120: Sulco, moderately eroded-----	55	Not limited		Not limited		Somewhat limited: Too steep for surface application	0.31
McConaughy, moderately eroded--	30	Not limited		Not limited		Somewhat limited: Too steep for surface application	0.08
7121: Sulco, moderately eroded-----	65	Not limited		Not limited		Somewhat limited: Too steep for surface application Too steep for sprinkler application	0.97 0.05
McConaughy, moderately eroded--	25	Not limited		Not limited		Somewhat limited: Too steep for surface application Too steep for sprinkler application	0.08 0.05
7122: Sulco, moderately eroded-----	70	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Too steep for surface application Too steep for sprinkler application	1.00 1.00
McConaughy, moderately eroded--	20	Somewhat limited: Slope	0.63	Somewhat limited: Slope	0.63	Very limited: Too steep for surface application Too steep for sprinkler application	1.00 0.77
7582: Valent-----	90	Very limited: Filtering capacity Low adsorption Depth to dense layer Droughty Leaching	1.00 1.00 1.00 0.88 0.45	Very limited: Filtering capacity Droughty Low adsorption	1.00 0.88 0.50	Very limited: Filtering capacity Low adsorption Droughty Too steep for surface application	1.00 1.00 0.88 0.66

Table 15a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7586: Valent-----	95	Very limited: Filtering capacity Low adsorption Slope Depth to dense layer Droughty	 1.00 1.00 1.00 1.00 0.88	Very limited: Filtering capacity Slope Droughty Low adsorption	 1.00 1.00 0.88 0.50	Very limited: Filtering capacity Low adsorption Too steep for surface application Too steep for sprinkler application Droughty	 1.00 1.00  1.00  1.00 0.88
7588: Valent, rolling----	50	Very limited: Filtering capacity Low adsorption Slope Depth to dense layer Droughty	 1.00 1.00 1.00 1.00 0.88	Very limited: Filtering capacity Slope Droughty Low adsorption	 1.00 1.00 0.88 0.50	Very limited: Filtering capacity Low adsorption Too steep for surface application Too steep for sprinkler application Droughty	 1.00 1.00  1.00  1.00 0.88
Valent, hilly-----	45	Very limited: Slope Filtering capacity Low adsorption Depth to dense layer Droughty	 1.00 1.00 1.00 1.00 0.88 1.00	Very limited: Filtering capacity Slope Droughty Low adsorption	 1.00 1.00 0.88 0.50	Very limited: Filtering capacity Low adsorption Too steep for surface application Too steep for sprinkler application Droughty	 1.00 1.00  1.00  1.00 0.88

Table 15b.--Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Very limited: Seepage Too level Depth to bedrock	1.00 0.50 0.13	Very limited: Restricted permeability Depth to bedrock	1.00 1.00	Very limited: Filtering capacity Restricted permeability Depth to bedrock	1.00 0.15 0.13
1146: Alliance-----	65	Very limited: Seepage Depth to bedrock	1.00 0.42	Very limited: Restricted permeability Depth to bedrock	1.00 1.00	Somewhat limited: Depth to bedrock Restricted permeability	0.42 0.15
Rosebud-----	25	Very limited: Seepage Depth to bedrock	1.00 1.00	Very limited: Restricted permeability Depth to bedrock	1.00 1.00	Very limited: Depth to bedrock Restricted permeability	1.00 0.15
1198: Altvan-----	45	Very limited: Seepage	1.00	Very limited: Restricted permeability Slope	1.00 0.47	Very limited: Filtering capacity Too steep for surface application Restricted permeability	1.00 0.66 0.15
Eckley-----	30	Very limited: Seepage	1.00	Very limited: Restricted permeability Slope	1.00 0.47	Very limited: Filtering capacity Too steep for surface application Restricted permeability	1.00 0.66 0.21
Satanta, sandy substratum-----	20	Very limited: Seepage	1.00	Very limited: Restricted permeability Slope	1.00 0.47	Very limited: Filtering capacity Too steep for surface application Restricted permeability	1.00 0.66 0.21

Table 15b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1295: Ashollow-----	65	Very limited: Seepage Too steep for surface application	1.00  1.00	Very limited: Slope Restricted permeability	1.00 1.00	Very limited: Too steep for surface application Too steep for sprinkler application	1.00  1.00
Tassel-----	30	Very limited: Seepage Depth to bedrock Too steep for surface application	1.00 1.00 1.00	Very limited: Slope Depth to bedrock Restricted permeability	1.00 1.00 0.32	Very limited: Depth to bedrock Too steep for surface application Too steep for sprinkler application Filtering capacity	1.00  1.00 1.00 1.00 0.01
1588: Blueridge-----	50	Very limited: Seepage Low adsorption Too steep for surface application	1.00 1.00 1.00	Very limited: Slope	1.00	Very limited: Filtering capacity Low adsorption Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00
Altvan-----	35	Very limited: Seepage Too steep for surface application	1.00  0.21	Very limited: Restricted permeability Slope	1.00 1.00	Very limited: Filtering capacity Too steep for surface application Too steep for sprinkler application Restricted permeability	1.00  1.00 1.00 0.21 0.15
1782: Broadwater, frequently flooded-	90	Very limited: Flooding Seepage Low adsorption	1.00 1.00 0.93	Very limited: Flooding	1.00	Very limited: Filtering capacity Flooding Low adsorption	1.00 1.00 0.93
1944: Calamus, very rarely flooded-----	95	Very limited: Seepage Flooding	1.00 0.20	Very limited: Depth to saturated zone	1.00	Very limited: Filtering capacity	1.00

Table 15b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2072: Chappell-----	38	Very limited: Seepage	1.00	Somewhat limited: Restricted permeability	0.32	Very limited: Filtering capacity	1.00
Alice-----	33	Very limited: Seepage	1.00	Somewhat limited: Restricted permeability	0.32	Somewhat limited: Filtering capacity	0.01
Broadwater-----	24	Very limited: Flooding Seepage Low adsorption	1.00 1.00 0.93	Somewhat limited: Flooding	0.60	Very limited: Filtering capacity Low adsorption Flooding	1.00 0.93 0.60
2630: Duroc-----	90	Very limited: Seepage Too level	1.00 0.50	Very limited: Restricted permeability	1.00	Not limited	
2638: Duroc-----	90	Very limited: Seepage Too level	1.00 0.50	Very limited: Restricted permeability	1.00	Not limited	
2639: Duroc-----	90	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Not limited	
3050: Glenberg, rarely flooded-----	90	Very limited: Seepage Flooding	1.00 0.40	Somewhat limited: Restricted permeability	0.32	Somewhat limited: Filtering capacity	0.01
3140: Gothenburg, occasionally flooded-----	85	Very limited: Flooding Seepage Depth to saturated zone Low adsorption	1.00 1.00 1.00 1.00	Very limited: Depth to saturated zone Flooding	1.00 0.60	Very limited: Filtering capacity Depth to saturated zone Low adsorption Flooding	1.00 1.00 1.00 0.60
3952: Jankosh-----	85	Very limited: Seepage Sodium content Depth to saturated zone Too level Flooding	1.00 1.00 0.95 0.50 0.40	Very limited: Restricted permeability Depth to saturated zone	1.00 1.00	Very limited: Filtering capacity Sodium content Salinity Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.95 0.15

Table 15b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4028: Jayem-----	90	Very limited: Seepage	1.00	Somewhat limited: Restricted permeability	0.32	Somewhat limited: Filtering capacity	0.01
4070: Johnstown-----	35	Very limited: Seepage Too level	1.00 0.50	Very limited: Restricted permeability	1.00	Very limited: Filtering capacity Restricted permeability	1.00 0.21
Satanta, sandy substratum-----	31	Very limited: Seepage Too level	1.00 0.50	Very limited: Restricted permeability	1.00	Very limited: Filtering capacity Restricted permeability	1.00 0.21
Richfield-----	29	Very limited: Seepage Too level	1.00 0.50	Very limited: Restricted permeability	1.00	Very limited: Restricted permeability Filtering capacity	1.00 0.01
4151: Keith-----	90	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Somewhat limited: Restricted permeability	0.21
4152: Keith-----	90	Very limited: Seepage	1.00	Very limited: Restricted permeability Slope	1.00 0.03	Somewhat limited: Restricted permeability Too steep for surface application	0.21 0.17
4310: Kuma-----	95	Very limited: Seepage Too level	1.00 0.50	Very limited: Restricted permeability	1.00	Not limited	
4311: Kuma-----	90	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Somewhat limited: Restricted permeability	0.21
4472: Las Animas, frequently flooded-	95	Very limited: Flooding Seepage Depth to saturated zone Too level	1.00 1.00 1.00 0.50	Very limited: Flooding Depth to saturated zone Restricted permeability	1.00 1.00 1.00 1.00	Very limited: Filtering capacity Depth to saturated zone Flooding	1.00 1.00 1.00 1.00

Table 15b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4475: Las Animas, occasionally flooded-----	92	Very limited: Flooding Seepage Depth to saturated zone	 1.00 1.00 0.95	Very limited: Depth to saturated zone Restricted permeability Flooding	 1.00 1.00 0.60	Very limited: Filtering capacity Depth to saturated zone Flooding	 1.00 0.95 0.60
4592: Lexsworth, very rarely flooded----	85	Very limited: Seepage Too level Flooding Sodium content	 1.00 0.50 0.20 0.02	Very limited: Restricted permeability	 1.00	Very limited: Filtering capacity Restricted permeability Sodium content	 1.00 0.21 0.02
4655: Lodgepole, ponded---	95	Very limited: Seepage Ponding Depth to saturated zone Too level	 1.00 1.00 1.00 0.50	Very limited: Ponding Restricted permeability Depth to saturated zone	 1.00 1.00 1.00	Very limited: Ponding Depth to saturated zone Restricted permeability	 1.00 1.00 1.00
5212: Merrick, very rarely flooded-----	90	Somewhat limited: Seepage Too level Flooding	 0.69 0.50 0.20	Very limited: Restricted permeability Depth to saturated zone	 1.00 1.00	Somewhat limited: Restricted permeability	 0.21
6132: Platte, occasionally flooded-----	90	Very limited: Flooding Seepage Depth to saturated zone Too level	 1.00 1.00 1.00 0.50	Very limited: Depth to saturated zone Restricted permeability Flooding	 1.00 1.00 0.60	Very limited: Filtering capacity Depth to saturated zone Flooding	 1.00 1.00 0.60
6248: Ralton, very rarely flooded-----	90	Very limited: Seepage Too level Flooding	 1.00 0.50 0.20	Very limited: Restricted permeability Depth to saturated zone	 1.00 1.00	Somewhat limited: Filtering capacity	 0.01
6625: Sarben-----	90	Very limited: Seepage	 1.00	Somewhat limited: Restricted permeability	 0.32	Very limited: Filtering capacity	 1.00

Table 15b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6626: Sarben-----	90	Very limited: Seepage	1.00	Somewhat limited: Restricted permeability Slope	0.32 0.03	Very limited: Filtering capacity Too steep for surface application	1.00  0.17
6722: Satanta-----	65	Very limited: Seepage	1.00	Very limited: Restricted permeability Slope	1.00 0.03	Very limited: Filtering capacity Restricted permeability Too steep for surface application	1.00  0.21 0.17
Altvan-----	25	Very limited: Seepage	1.00	Very limited: Restricted permeability Slope	1.00 0.03	Very limited: Filtering capacity Too steep for surface application Restricted permeability	1.00  0.17 0.15
6725: Satanta, sandy substratum-----	45	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Very limited: Filtering capacity Restricted permeability	1.00 0.21
Ascalon-----	45	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Very limited: Filtering capacity Restricted permeability	1.00 0.21
6727: Satanta, sandy substratum-----	60	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Very limited: Filtering capacity Restricted permeability	1.00 0.21
Johnstown-----	18	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Very limited: Filtering capacity Restricted permeability	1.00 0.21
Altvan-----	15	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Very limited: Filtering capacity Restricted permeability	1.00 0.15

Table 15b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6817: Scoville-----	95	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Very limited: Filtering capacity	1.00
6930: Sidney-----	85	Very limited: Seepage	1.00	Very limited: Depth to bedrock	1.00	Somewhat limited: Depth to bedrock	0.42
		Depth to bedrock	0.42	Restricted permeability	1.00	Too steep for surface	
				Slope	0.03	application	0.17
6937: Sidney-----	65	Very limited: Seepage	1.00	Very limited: Depth to bedrock	1.00	Somewhat limited: Too steep for surface	
		Depth to bedrock	0.42	Restricted permeability	1.00	application	0.97
		Too steep for surface		Slope	0.96	Depth to bedrock	0.42
		application	0.12			Too steep for sprinkler application	0.12
Canyon-----	25	Very limited: Seepage	1.00	Very limited: Depth to bedrock	1.00	Very limited: Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted		Too steep for surface	
		Low adsorption	0.14	permeability	1.00	application	0.97
		Too steep for surface		Slope	0.96	Low adsorption	0.14
		application	0.12			Too steep for sprinkler application	0.12
7120: Sulco, moderately eroded-----	55	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Somewhat limited: Too steep for surface	
				Slope	0.12	application	0.31
McConaughy, moderately eroded--	30	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Somewhat limited: Too steep for surface	
						application	0.08
7121: Sulco, moderately eroded-----	65	Very limited: Seepage	1.00	Very limited: Restricted permeability	1.00	Somewhat limited: Too steep for surface	
		Too steep for surface		Slope	0.96	application	0.97
		application	0.12			Too steep for sprinkler application	0.12

Table 15b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7121: McConaughy, moderately eroded--	25	Very limited: Seepage Too steep for surface application	1.00  0.12	Very limited: Restricted permeability Slope	1.00 0.96	Somewhat limited: Too steep for surface application Too steep for sprinkler application	0.97  0.12
7122: Sulco, moderately eroded-----	70	Very limited: Seepage Too steep for surface application	1.00  1.00	Very limited: Slope Restricted permeability	1.00 1.00	Very limited: Too steep for surface application Too steep for sprinkler application	1.00  1.00
McConaughy, moderately eroded--	20	Very limited: Seepage Too steep for surface application	1.00  1.00	Very limited: Slope Restricted permeability	1.00 1.00	Very limited: Too steep for surface application Too steep for sprinkler application	1.00  1.00
7582: Valent-----	90	Very limited: Seepage Low adsorption	1.00 1.00	Somewhat limited: Slope	0.47	Very limited: Filtering capacity Low adsorption Too steep for surface application	1.00 1.00  0.66
7586: Valent-----	95	Very limited: Seepage Low adsorption Too steep for surface application	1.00 1.00 1.00	Very limited: Slope	1.00	Very limited: Filtering capacity Low adsorption Too steep for surface application	1.00 1.00  1.00
7588: Valent, rolling----	50	Very limited: Seepage Low adsorption Too steep for surface application	1.00 1.00 1.00	Very limited: Slope	1.00	Very limited: Filtering capacity Low adsorption Too steep for surface application	1.00 1.00  1.00

Table 15b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7588: Valent, hilly-----	45	Very limited: Seepage Too steep for surface application Low adsorption	1.00   1.00 1.00	Very limited: Slope	1.00	Very limited: Filtering capacity Low adsorption Too steep for surface application	  1.00 1.00  1.00

Table 16a.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. For gravel and sand, the larger the value, the greater the likelihood that the layer is a source. For topsoil, the smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class	Value	Rating class	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
1146: Alliance-----	65	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
Rosebud-----	25	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Depth to bedrock	0.58
1198: Altvan-----	45	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.17	Fair: Hard to reclaim	0.65
Eckley-----	30	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.08 0.17	Poor: Hard to reclaim Rock fragments Too sandy	0.00 0.02 0.44
Satanta, sandy substratum-----	20	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.90	Good	
1295: Ashollow-----	65	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Slope	0.16
Tassel-----	30	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Rock fragments Slope Depth to bedrock	0.00 0.00 0.00
1588: Blueridge-----	50	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.17 0.17	Poor: Hard to reclaim Slope Rock fragments Too sandy	0.00 0.00 0.03 0.44
Altvan-----	35	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.06 0.22	Fair: Hard to reclaim	0.92

Table 16a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class	Value	Rating class	Value	Rating class and limiting features	Value
1782: Broadwater, frequently flooded-	90	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.17 0.17	Poor: Hard to reclaim Rock fragments Too sandy	0.00 0.03 0.44
1944: Calamus, very rarely flooded-----	95	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.17 0.17	Poor: Too sandy Hard to reclaim	0.00 0.92
2072: Chappell-----	38	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.06 0.10	Fair: Hard to reclaim	0.54
Alice-----	33	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.08 0.08	Good	
Broadwater-----	24	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.17 0.17	Poor: Hard to reclaim Rock fragments Too sandy	0.00 0.03 0.44
2630: Duroc-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
2638: Duroc-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
2639: Duroc-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
3050: Glenberg, rarely flooded-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.02 0.04	Good	
3140: Gothenburg, occasionally flooded-----	85	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.16 0.90	Poor: Depth to saturated zone Hard to reclaim Rock fragments Too sandy	0.00 0.00 0.03 0.50

Table 16a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class	Value	Rating class	Value	Rating class and limiting features	Value
3952: Jankosh-----	85	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.17	Poor: Sodium content Salinity Depth to saturated zone Hard to reclaim	0.00 0.00 0.76 0.80
4028: Jayem-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.02 0.02	Good	
4070: Johnstown-----	35	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.16	Fair: Too clayey Hard to reclaim	0.81 0.98
Satanta, sandy substratum-----	31	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.90	Good	
Richfield-----	29	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.08 0.16	Good	
4151: Keith-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Too clayey	0.66
4152: Keith-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
4310: Kuma-----	95	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
4311: Kuma-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Too clayey	0.81
4472: Las Animas, frequently flooded-	95	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.02 0.04	Poor: Depth to saturated zone	0.00
4475: Las Animas, occasionally flooded-----	92	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.02 0.04	Fair: Depth to saturated zone	0.76

Table 16a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class	Value	Rating class	Value	Rating class and limiting features	Value
4592: Lexsworth, very rarely flooded-----	85	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.26 0.39	Fair: Hard to reclaim	0.20
4655: Lodgepole, ponded---	95	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Too clayey Depth to saturated zone	0.00 0.00
5212: Merrick, very rarely flooded-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
6132: Platte, occasionally flooded-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.16	Poor: Hard to reclaim Rock fragments Too sandy Depth to saturated zone	0.00 0.03 0.50 0.53
6248: Ralton, very rarely flooded-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.22	Good	
6625: Sarben-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
6626: Sarben-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
6722: Satanta-----	65	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.11	Good	
Altvan-----	25	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.16	Fair: Hard to reclaim	0.98
6725: Satanta, sandy substratum-----	45	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.90	Good	
Ascalon-----	45	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.02 0.04	Good	

Table 16a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class	Value	Rating class	Value	Rating class and limiting features	Value
6727: Satanta, sandy substratum-----	60	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.90	Good	
Johnstown-----	18	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.90	Fair: Too clayey	0.81
Altvan-----	15	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.00 0.39	Fair: Too sandy Rock fragments Hard to reclaim	0.02 0.50 0.54
6817: Scoville-----	95	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Thickest layer Bottom layer	0.10 0.11	Good	
6930: Sidney-----	85	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
6937: Sidney-----	65	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
Canyon-----	25	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Depth to bedrock	0.00
7120: Sulco, moderately eroded-----	55	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
McConaughy, moderately eroded--	30	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
7121: Sulco, moderately eroded-----	65	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	
McConaughy, moderately eroded--	25	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Good	

Table 16a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class	Value	Rating class	Value	Rating class and limiting features	Value
7122: Sulco, moderately eroded-----	70	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Slope	0.00
McConaughy, moderately eroded--	20	Poor: Bottom layer Thickest layer	0.00 0.00	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Slope	0.37
7582: Valent-----	90	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.10 0.10	Good	
7586: Valent-----	95	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.10 0.10	Poor: Slope	0.00
7588: Valent, rolling-----	50	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.10 0.10	Poor: Slope	0.00
Valent, hilly-----	45	Poor: Bottom layer Thickest layer	0.00 0.00	Fair: Bottom layer Thickest layer	0.10 0.10	Poor: Slope	0.00

Table 16b.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1130: Alliance-----	90	Fair: Low content of organic matter No water erosion	 0.88 0.99	Fair: Depth to bedrock	 0.87
1146: Alliance-----	65	Fair: Low content of organic matter No water erosion	 0.88 0.99	Fair: Depth to bedrock	 0.58
Rosebud-----	25	Fair: Depth to bedrock Low content of organic matter Water erosion Droughty	 0.58 0.88 0.90 0.92	Poor: Depth to bedrock	 0.00
1198: Altvan-----	45	Fair: Low content of organic matter No water erosion	 0.88 0.99	Good	
Eckley-----	30	Fair: Droughty Too sandy Low content of organic matter	 0.04 0.44 0.88	Good	
Satanta, sandy substratum-----	20	Fair: Low content of organic matter Water erosion	 0.12 0.90	Good	
1295: Ashollow-----	65	Fair: Low content of organic matter Water erosion	 0.88 0.90	Good	
Tassel-----	30	Poor: Droughty Depth to bedrock Low content of organic matter	 0.00 0.00 0.12	Poor: Depth to bedrock Slope	 0.00 0.50

Table 16b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material	Potential source of roadfill		
		Rating class and limiting features	Value	Rating class and limiting features	Value
1588: Blueridge-----	50	Poor: Wind erosion Droughty Low content of organic matter Too sandy	0.00 0.00 0.12 0.44	Fair: Slope	0.82
Altvan-----	35	Fair: Low content of organic matter	0.12	Good	
1782: Broadwater, frequently flooded-	90	Poor: Droughty Wind erosion Low content of organic matter Too sandy	0.00 0.00 0.12 0.44	Good	
1944: Calamus, very rarely flooded-----	95	Poor: Too sandy Wind erosion Droughty Low content of organic matter	0.00 0.00 0.03 0.12	Good	
2072: Chappell-----	38	Fair: Low content of organic matter Droughty	0.12 0.92	Good	
Alice-----	33	Fair: Low content of organic matter	0.88	Good	
Broadwater-----	24	Poor: Droughty Wind erosion Low content of organic matter Too sandy	0.00 0.00 0.12 0.44	Good	
2630: Duroc-----	90	Fair: Low content of organic matter Water erosion	0.88 0.90	Good	
2638: Duroc-----	90	Fair: Low content of organic matter Water erosion	0.88 0.90	Good	

Table 16b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material	Potential source of roadfill		
		Rating class and limiting features	Value	Rating class and limiting features	Value
2639: Duroc-----	90	Fair: Low content of organic matter Water erosion	0.88 0.90	Good	
3050: Glenberg, rarely flooded-----	90	Fair: Low content of organic matter	0.88	Good	
3140: Gothenburg, occasionally flooded-----	85	Poor: Droughty Low content of organic matter Too sandy	0.00 0.12 0.50	Poor: Depth to saturated zone	0.00
3952: Jankosh-----	85	Poor: Sodium content Too alkaline Low content of organic matter Salinity Water erosion	0.00 0.00 0.12 0.88 0.90	Fair: Depth to saturated zone	0.76
4028: Jayem-----	90	Fair: Low content of organic matter	0.18	Good	
4070: Johnstown-----	35	Fair: Too clayey No water erosion	0.98 0.99	Poor: Low strength	0.00
Satanta, sandy substratum-----	31	Fair: Low content of organic matter Water erosion	0.12 0.90	Good	
Richfield-----	29	Fair: Low content of organic matter Water erosion	0.88 0.90	Good	
4151: Keith-----	90	Fair: Low content of organic matter Water erosion Too clayey	0.12 0.90 0.92	Fair: Low strength	0.78

Table 16b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material	Potential source of roadfill		
		Rating class and limiting features	Value	Rating class and limiting features	Value
4152: Keith-----	90	Fair: Low content of organic matter Water erosion	0.88 0.90	Good	
4310: Kuma-----	95	Fair: Low content of organic matter No water erosion	0.88 0.99	Good	
4311: Kuma-----	90	Fair: Low content of organic matter Water erosion Too clayey	0.88 0.90 0.98	Good	
4472: Las Animas, frequently flooded-	95	Fair: Low content of organic matter	0.88	Poor: Depth to saturated zone	0.00
4475: Las Animas, occasionally flooded-----	92	Fair: Low content of organic matter	0.88	Fair: Depth to saturated zone	0.76
4592: Lexsworth, very rarely flooded----	85	Fair: Low content of organic matter Droughty	0.12 1.00	Good	
4655: Lodgepole, ponded---	95	Poor: Too clayey Low content of organic matter Water erosion	0.00 0.88 0.90	Poor: Depth to saturated zone Shrink-swell	0.00 0.92
5212: Merrick, very rarely flooded-----	90	Fair: No water erosion	0.99	Poor: Low strength	0.00
6132: Platte, occasionally flooded-----	90	Fair: Low content of organic matter Droughty Too sandy	0.12 0.39 0.50	Fair: Depth to saturated zone	0.53

Table 16b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6248: Ralton, very rarely flooded-----	90	Fair: Low content of organic matter Water erosion	0.50 0.90	Good	
6625: Sarben-----	90	Poor: Wind erosion Low content of organic matter Droughty	0.00 0.12 0.99	Good	
6626: Sarben-----	90	Poor: Wind erosion Low content of organic matter Droughty	0.00 0.12 0.99	Good	
6722: Satanta-----	65	Fair: Low content of organic matter Water erosion	0.12 0.90	Good	
Altvan-----	25	Fair: Low content of organic matter Water erosion	0.12 0.90	Good	
6725: Satanta, sandy substratum-----	45	Fair: Low content of organic matter Water erosion	0.12 0.90	Good	
Ascalon-----	45	Fair: Low content of organic matter	0.12	Good	
6727: Satanta, sandy substratum-----	60	Fair: Low content of organic matter Water erosion	0.12 0.90	Good	
Johnstown-----	18	Fair: Water erosion Too clayey	0.90 0.98	Good	
Altvan-----	15	Fair: Too sandy Low content of organic matter No water erosion	0.02 0.12 0.99	Good	

Table 16b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material	Potential source of roadfill		
		Rating class and limiting features	Value	Rating class and limiting features	Value
6817: Scoville-----	95	Poor: Wind erosion Low content of organic matter Droughty	0.00 0.12 0.78	Good	
6930: Sidney-----	85	Fair: Low content of organic matter No water erosion	0.88 0.99	Fair: Depth to bedrock	0.58
6937: Sidney-----	65	Fair: Low content of organic matter No water erosion	0.88 0.99	Fair: Depth to bedrock	0.58
Canyon-----	25	Poor: Depth to bedrock Droughty	0.00 0.00	Poor: Depth to bedrock	0.00
7120: Sulco, moderately eroded-----	55	Fair: Low content of organic matter Water erosion	0.88 0.90	Good	
McConaughy, moderately eroded--	30	Fair: Low content of organic matter Water erosion	0.12 0.90	Good	
7121: Sulco, moderately eroded-----	65	Fair: Low content of organic matter Water erosion	0.88 0.90	Good	
McConaughy, moderately eroded--	25	Fair: Low content of organic matter Water erosion	0.12 0.90	Good	
7122: Sulco, moderately eroded-----	70	Fair: Low content of organic matter Water erosion	0.88 0.90	Good	
McConaughy, moderately eroded--	20	Fair: Low content of organic matter Water erosion	0.12 0.90	Good	

Table 16b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material	Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features
7582: Valent-----	90	Poor: Wind erosion Droughty Low content of organic matter	0.00 0.12 0.12	Good
7586: Valent-----	95	Poor: Wind erosion Droughty Low content of organic matter	0.00 0.12 0.12	Fair: Slope
7588: Valent, rolling----	50	Poor: Wind erosion Droughty Low content of organic matter	0.00 0.12 0.12	Fair: Slope
Valent, hilly-----	45	Poor: Wind erosion Droughty Low content of organic matter	0.00 0.12 0.12	Poor: Slope

Table 17.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for further investigation. See text for definitions of terms used in this table.)

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrace diver
1130: Alliance-----	Moderate: seepage depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes
1146: Alliance-----	Moderate: seepage depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes
Rosebud-----	Moderate: seepage depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: depth to rock	Limitat erodes depth
1198: Altvan-----	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope	Limitat erodes too sa
Eckley-----	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitat too sa
Satanta-----	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Favorable	Favorab
1295: Ashollow-----	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitat erodes slope soil b
Tassel-----	Severe: slope depth to rock	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitat slope soil b depth
1588: Blueridge-----	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitat slope too sa soil b

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces divers
1588: Altvan-----	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope	Limitati: erodes too sar
1782: Broadwater-----	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake soil blowing droughty	Limitati: too sar soil bl
1944: Calamus-----	Severe: seepage	Severe: seepage piping	Severe: cutbanks cave	Limitation: deep to water	Limitation: fast intake soil blowing droughty	Limitati: too sar soil bl
2072: Chappell-----	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: droughty	Limitati: too sar soil bl
Alice-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing droughty	Limitati: soil bl
Broadwater-----	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake soil blowing droughty	Limitati: too sar soil bl
2630: Duroc-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitati: erodes
2638: Duroc-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitati: erodes
2639: Duroc-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitati: erodes
3050: Glenberg-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing droughty	Limitati: too sar

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrace diver
3140: Gothenburg-----	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: flooding cutbanks cave	Limitation: fast intake wetness droughty	Limitat too sa wetnes
3952: Jankosh-----	Severe: seepage	Severe: seepage wetness	Severe: cutbanks cave	Limitation: excess salt cutbanks cave	Limitation: rooting depth wetness	Limitat erodes too sa wetnes
4028: Jayem-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitat soil b
4070: Johnstown-----	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes
Satanta-----	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Favorable	Favorab
Richfield-----	Slight	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes
4151: Keith-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes
4152: Keith-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes
4310: Kuma-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes
4311: Kuma-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrace diver
4472: Las Animas-----	Severe: seepage	Severe: piping wetness	Severe: cutbanks cave	Limitation: flooding frost action cutbanks cave	Limitation: rooting depth wetness droughty	Limitat wetnes
4475: Las Animas-----	Severe: seepage	Severe: piping wetness	Severe: cutbanks cave	Limitation: flooding frost action cutbanks cave	Limitation: rooting depth wetness droughty	Limitat wetnes
4592: Lexsworth-----	Severe: seepage	Severe: seepage piping	Severe: cutbanks cave	Limitation: deep to water	Favorable	Limitat too sa
4655: Lodgepole-----	Severe: seepage	Severe: pounding	Severe: no water	Limitation: frost action percs slowly ponding	Limitation: erodes easily percs slowly ponding	Limitat erodes percs pondin
5212: Merrick-----	Moderate: seepage	Severe: piping	Moderate: slow refill deep to water	Limitation: deep to water	Favorable	Limitat erodes
6132: Platte-----	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: flooding cutbanks cave	Limitation: wetness droughty	Limitat too sa wetnes
6248: Ralton-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitat erodes
6625: Sarben-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake droughty	Limitat soil b
6626: Sarben-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake droughty	Limitat soil b

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces divers
6722: Satanta-----	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope	Favorabl
	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope	Limitati erodes too san
6725: Satanta-----	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitati soil bl
	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: droughty	Limitati soil bl
6727: Satanta-----	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Favorable	Favorabl
	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Favorable	Limitati erodes
6817: Scoville-----	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Favorable	Limitati erodes too san
	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake soil blowing droughty	Limitati too san soil bl
6930: Sidney-----	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitati erodes

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces divers
6937: Sidney-----						
	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes
Canyon-----	Severe: depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: depth to rock
7120: Sulco-----	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes
McConaughy-----	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes
7121: Sulco-----	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes
McConaughy-----	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes
7122: Sulco-----	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes
McConaughy-----	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes
7582: Valent-----	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: too fast soil bl

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for--				Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds		Drainage	Irrigation	Terrace diver
7586: Valent-----	Severe: seepage slope	Severe: seepage piping	Severe: no water		Limitation: deep to water	Limitation: fast intake slope droughty	Limitat slope too sa soil b
7588: Valent, rolling-	Severe: seepage slope	Severe: seepage piping	Severe: no water		Limitation: deep to water	Limitation: fast intake slope droughty	Limitat slope too sa soil b
Valent, hilly---	Severe: seepage slope	Severe: seepage piping	Severe: no water		Limitation: deep to water	Limitation: fast intake slope droughty	Limitat slope too sa soil b

# Soil Properties

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Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

## Engineering Index Properties

Table 18 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

*Classification* of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Rock fragments* larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit and plasticity index* (Atterberg limits)

indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

## Physical Properties

Table 19 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 19, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at  $1/3$ - or  $1/10$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Permeability* ( $K_{sat}$ ) refers to the ability of a soil to transmit water or air. The term permeability, as used in soil surveys, indicates saturated hydraulic conductivity

( $K_{sat}$ ). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at  $1/3$ - or  $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In table 19, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in table 19 as the K factor ( $K_w$  and  $K_f$ ) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and

the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor Kw* indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor Kf* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- 4L. Calcareous loams, silt loams, clay loams, and silty clay loams.
4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface

layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

## Chemical Properties

Table 20 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Cation-exchange capacity* is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

*Soil reaction* is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

*Calcium carbonate* equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

*Gypsum* is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

*Salinity* is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability

of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

*Sodium adsorption ratio (SAR)* is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

## Soil Features

Table 21 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness of the restrictive layer, which significantly affects the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

*Potential for frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

*Risk of corrosion* pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and

electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

## Water Features

Table 22 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface,

and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

*Soil saturation* refers to a water table, or a saturated zone in the soil. Table 22 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

*Ponding* is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 22 indicates *surface water depth*, or the depth of the water above the surface of the soil, and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

*Flooding* is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short

periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

*Duration* and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.









Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	3-10			
							Pct	Pct	4	10
3050: Glenberg, rarely flooded	In									
	0-8	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	
	8-60	Stratified loamy fine sand to fine sandy loam to very fine sandy loam	SC	A-2, A-4	0	0	100	100	65-95	
3140: Gothenburg, occasionally flooded-----										
	0-5	Loamy sand	SM	A-2	0	0	100	90-100	50-70	
	5-14	Sand	SP-SM	A-3	0	0	100	90-100	50-70	
	14-60	Coarse sand	SP-SC	A-1, A-3, A-2	0	0	70-100	50-95	25-65	
3952: Jankosh-----										
	0-2	Loam	CL	A-4	0	0	100	100	85-95	
	2-4	Loam	CL	A-4	0	0	100	100	85-95	
	4-14	Sandy clay loam	SC	A-6	0	0	100	100	80-90	
	14-18	Loam	CL	A-4	0	0	100	100	85-95	
4028: Jayem-----	18-33	Very fine sandy loam	ML	A-4	0	0	100	100	85-95	
	33-60	Gravelly coarse sand	SP	A-1, A-2, A-3	0	0	70-100	50-95	25-65	
0-6 Fine sandy loam	0-6	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	
	6-9	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	
	9-22	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	
	22-50	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	
	50-60	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches			
							4	10	40
	In				Pct	Pct			
4070: Johnstown-----									
	0-9	Loam		A-4, A-6		0	0	100	100
	9-25	Silty clay loam	CL	A-6, A-7		0	0	100	100
	25-29	Silty clay loam	CL	A-6, A-7		0	0	100	100
	29-35	Loam	CL	A-6, A-7		0	0	100	100
	35-46	Very fine sandy loam	ML	A-4		0	0	100	100
	46-60	Coarse sand	SP-SC	A-1, A-3, A-2		0	0	70-100	50-95
Satanta, sandy substratum----									
	0-8	Loam	CL	A-4, A-6		0	0	100	100
	8-25	Clay loam	CL	A-6, A-7		0	0	100	100
	25-32	Loam	CL	A-6, A-7		0	0	100	100
	32-52	Very fine sandy loam	ML	A-4, A-6		0	0	100	100
	52-60	Sand	SP-SM	A-3		0	0	100	100
Richfield-----	0-7	Loam	CL	A-4		0	0	100	100
	7-12	Silty clay	CH	A-7		0	0	100	100
	12-17	Silty clay loam	CL	A-7		0	0	100	100
	17-21	Silt loam	CL-ML, CL, ML	A-4		0	0	100	100
	21-32	Silt loam	CL-ML, CL, ML	A-4		0	0	100	100
	32-42	Silt loam	CL, ML, CL-ML	A-4		0	0	100	100
	42-48	Fine sandy loam	SC	A-2, A-4		0	0	100	100
	48-78	Sandy loam	SC, SC-SM, SM	A-2, A-4		0	0	100	100
	78-80	Gravelly coarse sand	SP-SC	A-2-4, A-1, A-3		0	0	70-100	50-90
4151: Keith-----									
	0-6	Loam	CL	A-4		0	0	100	100
	6-13	Loam	CL	A-4		0	0	100	100
	13-22	Silty clay loam	CL	A-6, A-7		0	0	100	100
	22-31	Silt loam	CL, CL-ML, ML	A-6, A-7		0	0	100	100
	31-48	Silt loam	CL, CL-ML, ML	A-4, A-6		0	0	100	100
	48-60	Very fine sandy loam	ML	A-4, A-6		0	0	100	100
4152: Keith-----									
	0-7	Loam	CL	A-4		0	0	100	100
	7-14	Silty clay loam	CL	A-6, A-7		0	0	100	100
	14-19	Silt loam	CL-ML, CL, ML	A-6, A-7		0	0	100	100
	19-25	Loam	ML	A-4		0	0	100	100
	25-60	Loam	ML	A-4		0	0	100	100

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4		
							Pct	Pct	Pct
4310: Kuma-----	In								
	0-7	Loam	CL	A-4		0	0	100	100
	7-17	Loam	CL	A-4		0	0	100	100
	17-24	Loam	CL	A-6, A-7		0	0	100	100
	24-37	Loam	CL	A-6, A-7		0	0	100	100
	37-44	Loam	CL	A-6, A-7		0	0	100	100
4311: Kuma-----	44-60	Loam	CL	A-4, A-6		0	0	100	100
	0-6	Loam	CL	A-4		0	0	100	100
	6-10	Silty clay loam	CL	A-6, A-7		0	0	100	100
	10-23	Silty clay loam	CL	A-6, A-7		0	0	100	100
	23-33	Silty clay loam	CL	A-6, A-7		0	0	100	100
4472: Las Animas, frequently flooded-----	33-41	Silt loam	CL, ML, CL-ML	A-4		0	0	100	100
	41-60	Loam	CL	A-4, A-6		0	0	100	100
	0-5	Loam	CL	A-4		0	0	100	100
	5-11	Fine sandy loam	SC-SM	A-2, A-4		0	0	100	100
	11-33	Stratified sandy loam to fine sandy loam	SC	A-2, A-4		0	0	100	100
4475: Las Animas, occasionally flooded-----	33-60	Stratified loamy fine sand to very fine sandy loam	SC	A-2, A-4		0	0	100	100
	0-5	Loam	CL	A-4		0	0	100	100
	5-11	Fine sandy loam	SC-SM	A-2, A-4		0	0	100	100
	11-33	Stratified sandy loam to fine sandy loam	SC	A-2, A-4		0	0	100	100
	33-60	Stratified loamy fine sand to very fine sandy loam	SC	A-2, A-4		0	0	100	100



Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40		
6248: Ralton, very rarely flooded	In				Pct	Pct					
	0-6	Loam	CL	A-4	0	0	100	100	85-95		
	6-14	Loam	CL	A-4	0	0	100	100	85-95		
	14-24	Stratified very fine sandy loam to loam	ML	A-4	0	0	100	100	85-95		
	24-34	Very fine sandy loam	ML	A-4	0	0	100	100	85-95		
6625: Sarben-----	34-51	Loam	CL	A-4	0	0	100	100	85-95		
	51-71	Very fine sandy loam	ML	A-4	0	0	100	100	85-95		
	71-80	Gravelly loamy coarse sand	SP-SC	A-1	0	0	70-100	50-90	25-65		
6626: Sarben-----	0-7	Loamy fine sand	SC	A-2	0	0	100	100	65-80		
	7-15	Fine sandy loam	SC-SM	A-4	0	0	100	100	70-85		
	15-32	Fine sandy loam	SC-SM	A-4	0	0	100	100	70-85		
	32-60	Fine sandy loam	SC-SM	A-4	0	0	100	100	70-85		
6722: Satanta-----	0-6	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95		
	6-13	Clay loam	CL	A-6, A-7	0	0	100	100	90-100		
	13-19	Clay loam	CL	A-6, A-7	0	0	100	100	90-100		
	19-26	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95		
	26-52	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95		
	52-76	Loamy fine sand	SC	A-2, A-3	0	0	100	100	65-80		
Altvan-----	0-5	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85		
	5-10	Clay loam	CL	A-4, A-6	0	0	100	100	90-100		
	10-14	Clay loam	CL	A-4, A-6	0	0	100	100	90-100		
	14-24	Loam	CL	A-4	0	0	100	100	85-95		
	24-38	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95		
	38-80	Coarse sand	SP-SC	A-1, A-2, A-3	0	0	70-100	50-95	25-65		



Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number-		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
6817: Scoville-----	In				Pct	Pct			
	0-6	Loamy fine sand	SC	A-2	0	0	100	100	65-80
	6-10	Loamy fine sand	SC	A-2, A-3	0	0	100	100	65-80
	10-42	Fine sand	SP-SM	A-3	0	0	100	100	65-80
	42-46	Very fine sandy loam	ML	A-4	0	0	100	100	85-95
	46-60	Loamy fine sand	SC	A-2, A-3	0	0	100	100	65-80
6930: Sidney-----	0-11	Loam	CL	A-4, A-6	0	0	95-100	90-100	85-95
	11-17	Loam	CL	A-4, A-6	0	0	95-100	85-100	85-95
	17-29	Very fine sandy loam	ML	A-4, A-6	0	0	95-100	80-100	85-95
	29-48	Very fine sandy loam	ML	A-4, A-6	0	0	95-100	80-100	85-95
	48-60	Weathered bedrock		---	---	---	---	---	---
6937: Sidney-----	0-11	Loam	CL	A-6, A-4	0	0	95-100	90-100	85-95
	11-17	Loam	CL	A-4, A-6	0	0	95-100	85-100	85-95
	17-29	Very fine sandy loam	ML	A-4, A-6	0	0	95-100	80-100	85-95
	29-48	Very fine sandy loam	ML	A-4, A-6	0	0	95-100	80-100	85-95
	48-60	Weathered bedrock		---	---	---	---	---	---
Canyon-----	0-5	Loam	CL	A-4	0	0-5	95-100	95-100	50-67
	5-10	Very fine sandy loam	ML	A-4, A-2, A-6	0	0-5	95-100	95-100	40-57
	10-60	Weathered bedrock		---	---	---	---	---	---



Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches			
							4	10	40
	In				Pct	Pct			
7582: Valent-----	0-4	Fine sand	SP-SM	A-3	0	0	100	100	65-80
	4-60	Fine sand	SP-SM	A-3	0	0	100	100	65-80
7586: Valent-----	0-4	Fine sand	SP-SM	A-3	0	0	100	100	65-80
	4-60	Fine sand	SP-SM	A-3	0	0	100	100	65-80
7588: Valent, rolling	0-4	Fine sand	SP-SM	A-3	0	0	100	100	65-80
	4-60	Fine sand	SP-SM	A-3	0	0	100	100	65-80
Valent, hilly--	0-4	Fine sand	SP-SM	A-3	0	0	100	100	65-80
	4-60	Fine sand	SP-SM	A-3	0	0	100	100	65-80

Table 19.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								K	Kf	T		
	In	Pct	g/cc	in/hr	In/in	Pct	Pct					
1130:												
Alliance-----	0-6	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-17	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-24	10-27	1.45-1.65	0.60-2.00	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	24-34	10-27	1.45-1.65	0.60-2.00	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	34-47	10-20	1.30-1.40	0.60-2.00	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	47-54	2-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
	54-80	---	---	0.20-0.60	---	---	---	---	---			
1146:												
Alliance-----	0-6	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-14	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	14-19	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	19-25	10-27	1.45-1.65	0.60-2.00	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	25-45	10-20	1.30-1.40	0.60-2.00	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	45-60	---	---	0.20-0.60	---	---	---	---	---			
Rosebud-----	0-6	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	3	5	56
	6-11	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	11-17	25-35	1.30-1.50	0.20-0.60	0.17-0.18	3.0-5.9	0.5-1.0	.43	.43			
	17-23	10-27	1.45-1.65	0.60-2.00	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	23-30	10-20	1.30-1.40	0.60-2.00	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	30-80	---	---	0.20-0.60	---	---	---	---	---			
1198:												
Altvan-----	0-7	8-20	1.30-1.50	2.00-6.00	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	4	5	56
	7-12	18-27	1.45-1.65	0.60-2.00	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	12-17	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-25	10-20	1.30-1.40	0.60-2.00	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	25-31	5-15	1.55-1.75	6.00-20.00	0.08-0.10	0.0-1.0	0.0-0.5	.17	.17			
	31-80	0-5	1.65-1.85	20.00-20.00	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
Eckley-----	0-5	10-20	1.30-1.50	2.00-6.00	0.13-0.15	0.0-1.0	1.0-3.0	.20	.28	3	3	86
	5-8	20-30	1.35-1.55	0.20-0.60	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	8-11	10-20	1.50-1.70	2.00-6.00	0.12-0.14	0.0-2.9	0.5-1.0	.15	.28			
	11-15	0-5	1.65-1.85	20.00-20.00	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
	15-80	0-5	1.65-1.85	20.00-20.00	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
Satanta, sandy substratum----	0-10	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	10-21	10-27	1.45-1.65	0.60-2.00	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	21-30	25-35	1.30-1.50	0.20-0.60	0.17-0.18	3.0-5.9	0.5-1.0	.43	.43			
	30-37	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	37-42	10-20	1.30-1.40	0.60-2.00	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	42-50	2-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
	50-80	2-5	1.60-1.80	6.00-20.00	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
1295:												
Ashollow-----	0-3	5-18	1.20-1.40	0.60-2.00	0.17-0.19	0.0-1.0	1.0-2.0	.37	.37	5	3	86
	3-10	5-18	1.40-1.65	0.60-2.00	0.16-0.18	0.0-1.0	1.0-2.0	.37	.37			
	10-32	5-18	1.40-1.65	0.60-2.00	0.16-0.18	0.0-1.0	0.5-1.0	.43	.43			
	32-60	5-18	1.40-1.65	0.60-2.00	0.16-0.18	0.0-1.0	0.5-1.0	.43	.43			
Tassel-----	0-4	5-12	1.30-1.70	2.00-6.00	0.16-0.18	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	4-7	5-12	1.50-1.70	2.00-6.00	0.12-0.16	0.0-2.9	0.5-1.0	.24	.24			
	7-18	5-12	1.50-1.70	2.00-6.00	0.12-0.16	0.0-2.9	0.0-0.5	.10	.20			
	18-60	---	---	0.20-0.60	---	---	---	---	---			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								K	Kf	T		
	In	Pct	g/cc	in/hr	In/in	Pct	Pct					
1588: Blueridge-----	0-4	0-5	1.45-1.65	20.00-20.00	0.04-0.06	0.0-2.9	0.5-1.0	.10	.10	2	1	160
	4-40	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
	40-80	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
Altvan-----	0-7	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	7-10	20-30	1.35-1.55	0.20-0.60	0.15-0.17	0.0-2.9	0.5-1.0	.24	.24			
	10-20	20-30	1.35-1.55	0.20-0.60	0.15-0.17	0.0-2.9	0.5-1.0	.24	.24			
	20-24	10-20	1.30-1.40	0.60-2.00	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	24-30	5-15	1.55-1.75	6.00-20.00	0.08-0.10	0.0-1.0	0.0-0.5	.17	.17			
	30-80	0-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-2.9	0.0-0.5	.10	.15			
1782: Broadwater, frequently flooded-----	0-3	7-15	1.35-1.55	6.00-20.00	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	3	2	134
	3-9	3-10	1.55-1.75	6.00-20.00	0.08-0.10	0.0-2.9	0.5-1.0	.17	.17			
	9-32	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
	32-60	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
1944: Calamus, very rarely flooded-	0-7	7-20	1.25-1.55	6.00-20.00	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	5	2	134
	7-14	0-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-0.0	0.5-1.0	.17	.17			
	14-22	0-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-0.0	0.5-1.0	.17	.17			
	22-38	0-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-0.0	0.5-1.0	.17	.17			
	38-58	0-5	1.65-1.85	20.00-20.00	0.02-0.04	0.0-1.0	0.0-0.5	.15	.17			
	58-60	0-5	1.65-1.85	20.00-20.00	0.02-0.04	0.0-1.0	0.0-0.5	.15	.17			
2072: Chappell-----	0-7	8-20	1.30-1.50	2.00-6.00	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	4	3	86
	7-17	8-20	1.30-1.50	2.00-6.00	0.12-0.16	0.0-2.9	1.0-2.0	.20	.20			
	17-25	8-20	1.50-1.70	2.00-6.00	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	25-30	8-20	1.50-1.70	2.00-6.00	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	30-60	8-20	1.65-1.85	20.00-20.00	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
Alice-----	0-8	7-10	1.30-1.50	2.00-6.00	0.13-0.15	0.0-1.0	1.0-2.0	.20	.20	5	3	86
	8-14	7-10	1.30-1.50	2.00-6.00	0.13-0.15	0.0-1.0	1.0-2.0	.20	.20			
	14-19	5-18	1.50-1.70	2.00-6.00	0.12-0.14	0.0-1.0	0.5-1.0	.28	.28			
	19-33	5-18	1.50-1.70	2.00-6.00	0.11-0.13	0.0-1.0	0.5-1.0	.28	.28			
	33-80	5-18	1.50-1.70	2.00-6.00	0.11-0.13	0.0-1.0	0.5-1.0	.28	.28			
Broadwater-----	0-3	7-15	1.35-1.55	6.00-20.00	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	3	2	134
	3-9	3-10	1.55-1.75	6.00-20.00	0.08-0.10	0.0-2.9	0.5-1.0	.17	.17			
	9-32	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
	32-60	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
2630: Duroc-----	0-6	15-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	6-14	15-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	14-27	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	1.0-3.0	.43	.43			
	27-32	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	1.0-3.0	.43	.43			
	32-42	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	42-60	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
2638: Duroc-----	0-12	15-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	12-24	15-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	24-31	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	1.0-3.0	.43	.43			
	31-37	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	37-46	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	46-60	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								K	Kf	T		
	In	Pct	g/cc	in/hr	In/in	Pct	Pct					
2639:												
Duroc-----	0-12	15-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	12-24	15-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	24-31	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	1.0-3.0	.43	.43			
	31-37	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	37-46	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	46-60	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
3050:												
Glenberg, rarely flooded-----	0-8	8-20	1.30-1.50	2.00-6.00	0.16-0.18	0.0-2.9	0.5-2.0	.24	.24	5	3	86
	8-60	5-18	1.40-1.75	2.00-6.00	0.08-0.16	0.0-1.0	0.5-1.0	.28	.28			
3140:												
Gothenburg, occasionally flooded-----	0-5	7-15	1.35-1.55	6.00-20.00	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	2	8	134
	5-14	1-5	1.60-1.70	20.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
	14-60	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
3952:												
Jankosh-----	0-2	15-25	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	2-4	15-25	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	0.5-1.0	.32	.32			
	4-14	20-30	1.35-1.65	0.20-0.60	0.16-0.18	0.0-2.9	0.5-1.0	.37	.37			
	14-18	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.0-0.5	.43	.43			
	18-33	10-18	1.50-1.70	0.60-2.00	0.17-0.19	0.0-1.0	0.0-0.5	.43	.43			
	33-60	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
4028:												
Jayem-----	0-6	5-18	1.30-1.50	2.00-6.00	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	6-9	5-18	1.50-1.70	2.00-6.00	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20			
	9-22	5-18	1.50-1.70	2.00-6.00	0.15-0.17	0.0-2.9	0.5-1.0	.32	.32			
	22-50	5-18	1.50-1.70	2.00-6.00	0.12-0.16	0.0-2.9	0.1-0.5	.32	.32			
	50-60	5-18	1.50-1.70	2.00-6.00	0.12-0.16	0.0-2.9	0.1-0.5	.32	.32			
4070:												
Johnstown-----	0-9	18-27	1.25-1.45	0.60-2.00	0.20-0.24	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	9-25	27-35	1.25-1.45	0.20-0.60	0.18-0.20	3.0-5.9	0.5-2.0	.37	.37			
	25-29	27-35	1.25-1.45	0.20-0.60	0.18-0.20	3.0-5.9	0.5-2.0	.37	.37			
	29-35	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	35-46	10-20	1.30-1.40	0.60-2.00	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	46-60	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
Satanta, sandy substratum-----	0-8	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	8-25	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	25-32	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	32-52	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	52-60	2-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
Richfield-----	0-7	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32	5	6	48
	7-12	40-50	1.20-1.40	0.01-0.06	0.11-0.16	6.0-8.9	1.0-3.0	.28	.28			
	12-17	27-35	1.25-1.45	0.20-0.60	0.18-0.20	3.0-5.9	0.5-2.0	.37	.37			
	17-21	18-27	1.45-1.65	0.60-2.00	0.18-0.20	0.0-2.9	0.5-1.0	.43	.43			
	21-32	18-27	1.45-1.65	0.60-2.00	0.18-0.20	0.0-2.9	0.5-1.0	.43	.43			
	32-42	18-27	1.45-1.65	0.60-2.00	0.18-0.20	0.0-2.9	0.5-1.0	.43	.43			
	42-48	5-18	1.50-1.70	2.00-6.00	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	48-78	5-18	1.50-1.70	2.00-6.00	0.11-0.13	0.0-1.0	0.5-1.0	.28	.28			
	78-80	0-5	1.65-1.85	20.00-20.00	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								K	Kf	T		
	In	Pct	g/cc	in/hr	In/in	Pct	Pct					
4151: Keith-----	0-6	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	6-13	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	13-22	27-35	1.25-1.45	0.20-0.60	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	22-31	20-35	1.40-1.65	0.60-2.00	0.18-0.20	0.0-2.9	0.5-1.0	.43	.43			
	31-48	18-27	1.40-1.65	0.60-2.00	0.18-0.20	0.0-2.9	0.0-0.5	.43	.43			
	48-60	10-18	1.40-1.65	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
4152: Keith-----	0-7	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	7-14	27-35	1.25-1.45	0.20-0.60	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	14-19	20-35	1.40-1.65	0.60-2.00	0.18-0.20	0.0-2.9	0.5-1.0	.43	.43			
	19-25	10-27	1.45-1.65	0.60-2.00	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	25-60	10-27	1.45-1.65	0.60-2.00	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
4310: Kuma-----	0-7	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	7-17	18-27	1.25-1.45	0.60-2.00	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	17-24	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	1.0-2.0	.37	.37			
	24-37	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	1.0-2.0	.37	.37			
	37-44	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	1.0-2.0	.37	.37			
	44-60	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
4311: Kuma-----	0-6	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	6-10	27-35	1.25-1.45	0.20-0.60	0.18-0.20	3.0-5.9	0.5-2.0	.37	.37			
	10-23	27-35	1.25-1.45	0.20-0.60	0.18-0.20	3.0-5.9	0.5-2.0	.37	.37			
	23-33	27-35	1.25-1.45	0.20-0.60	0.18-0.20	3.0-5.9	0.5-2.0	.37	.37			
	33-41	18-27	1.45-1.65	0.60-2.00	0.18-0.20	0.0-2.9	0.5-1.0	.43	.43			
	41-60	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
4472: Las Animas, frequently flooded-----	0-5	15-25	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-2.0	.32	.32	4	4L	86
	5-11	8-18	1.50-1.75	2.00-6.00	0.16-0.18	0.0-1.0	0.5-1.0	.24	.24			
	11-33	8-18	1.50-1.75	2.00-6.00	0.11-0.16	0.0-1.0	0.5-1.0	.24	.24			
	33-60	8-18	1.40-1.75	6.00-20.00	0.08-0.18	0.0-1.0	0.5-1.0	.24	.24			
4475: Las Animas, occasionally flooded-----	0-5	15-25	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-2.0	.32	.32	4	4L	86
	5-11	8-18	1.50-1.75	2.00-6.00	0.16-0.18	0.0-1.0	0.5-1.0	.24	.24			
	11-33	8-18	1.50-1.75	2.00-6.00	0.11-0.16	0.0-1.0	0.5-1.0	.24	.24			
	33-60	8-18	1.40-1.75	6.00-20.00	0.08-0.18	0.0-1.0	0.5-1.0	.24	.24			
4592: Lexsworth, very rarely flooded-	0-12	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	12-19	20-35	1.30-1.50	0.20-0.60	0.15-0.17	0.0-2.9	0.5-1.0	.28	.28			
	19-26	8-20	1.50-1.70	2.00-6.00	0.06-0.12	0.0-1.0	0.0-0.5	.24	.24			
	26-33	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.10	.15			
	33-52	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
	52-60	0-5	1.60-1.80	6.00-20.00	0.05-0.07	0.0-2.9	0.0-0.5	.10	.15			
	60-80	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.10	.15			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								K	Kf	T		
	In	Pct	g/cc	in/hr	In/in	Pct	Pct					
4655: Lodgepole, ponded-----	0-5	18-27	1.20-1.45	0.60-2.00	0.20-0.23	0.0-2.9	2.0-4.0	.37	.37	3	6	48
	5-14	40-50	1.20-1.45	0.01-0.06	0.11-0.16	6.0-8.9	1.0-3.0	.28	.28			
	14-26	40-50	1.25-1.45	0.01-0.06	0.11-0.16	6.0-8.9	1.0-3.0	.28	.28			
	26-32	27-40	1.25-1.45	0.20-0.60	0.18-0.20	6.0-8.9	1.0-3.0	.28	.28			
	32-48	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	48-60	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
5212: Merrick, very rarely flooded-	0-12	18-27	1.15-1.35	0.20-0.60	0.18-0.20	0.0-2.9	2.0-4.0	.28	.28	5	6	48
	12-27	18-27	1.30-1.50	0.20-0.60	0.19-0.22	3.0-5.9	2.0-4.0	.28	.28			
	27-38	27-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-2.0	.37	.37			
	38-42	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	42-53	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	53-64	10-18	1.45-1.65	0.60-2.00	0.16-0.18	0.0-1.0	0.5-1.0	.37	.37			
	64-80	10-18	1.45-1.65	0.60-2.00	0.16-0.18	0.0-1.0	0.5-1.0	.37	.37			
6132: Platte, occasionally flooded-----	0-5	10-27	1.45-1.65	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	3	4L	86
	5-11	7-18	1.50-1.70	2.00-5.97	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	11-18	7-18	1.50-1.70	2.00-5.97	0.12-0.16	0.0-2.9	0.0-0.5	.28	.28			
	18-60	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
6248: Ralton, very rarely flooded-	0-6	15-25	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	4L	86
	6-14	15-25	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	14-24	10-25	1.40-1.65	0.60-6.00	0.16-0.18	0.0-1.0	0.0-1.0	.43	.43			
	24-34	10-18	1.40-1.65	0.60-2.00	0.16-0.18	0.0-1.0	0.0-1.0	.43	.43			
	34-51	15-25	1.40-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.0-1.0	.43	.43			
	51-71	10-18	1.40-1.65	2.00-6.00	0.16-0.18	0.0-1.0	0.0-1.0	.43	.43			
	71-80	0-5	1.40-1.65	20.00-20.00	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
6625: Sarben-----	0-7	7-12	1.35-1.55	6.00-20.00	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	5	2	134
	7-15	10-18	1.50-1.65	2.00-6.00	0.10-0.12	0.0-1.0	0.5-1.0	.24	.24			
	15-32	10-18	1.50-1.65	2.00-6.00	0.08-0.10	0.0-1.0	0.0-0.5	.24	.24			
	32-60	10-18	1.50-1.65	2.00-6.00	0.08-0.10	0.0-1.0	0.0-0.5	.24	.24			
6626: Sarben-----	0-7	7-12	1.35-1.55	6.00-20.00	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	5	2	134
	7-15	10-18	1.50-1.65	2.00-6.00	0.10-0.12	0.0-1.0	0.5-1.0	.24	.24			
	15-32	10-18	1.50-1.65	2.00-6.00	0.08-0.10	0.0-1.0	0.0-0.5	.24	.24			
	32-60	10-18	1.50-1.65	2.00-6.00	0.08-0.10	0.0-1.0	0.0-0.5	.24	.24			
6722: Satanta-----	0-6	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	1.0-3.0	.43	.43	5	6	48
	6-13	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	13-19	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	19-26	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	26-52	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	52-76	3-15	1.55-1.75	6.00-20.00	0.08-0.10	0.0-1.0	0.0-0.5	.15	.15			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								K	Kf	T		
	In	Pct	g/cc	in/hr	In/in	Pct	Pct					
6722:												
Altvan-----	0-5	8-20	1.30-1.50	2.00-6.00	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	4	5	56
	5-10	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	10-14	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	14-24	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	24-38	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	38-80	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
6725:												
Satanta, sandy substratum-----	0-9	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	3	86
	9-14	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	14-26	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	26-31	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	31-55	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	55-80	2-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
Ascalon-----	0-6	8-20	1.30-1.50	2.00-6.00	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	6-19	20-30	1.35-1.55	0.20-0.60	0.15-0.17	0.0-2.9	0.5-1.0	.24	.24			
	19-35	8-20	1.50-1.70	2.00-6.00	0.15-0.17	0.0-2.9	0.5-1.0	.24	.24			
	35-40	8-20	1.50-1.70	2.00-6.00	0.12-0.16	0.0-2.9	0.5-1.0	.17	.17			
	40-46	5-15	1.55-1.75	6.00-20.00	0.08-0.10	0.0-1.0	0.0-0.5	.17	.17			
	46-80	2-10	1.55-1.75	6.00-20.00	0.05-0.10	0.0-1.0	0.0-0.5	.17	.17			
6727:												
Satanta, sandy substratum-----	0-9	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	9-14	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	14-26	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	26-31	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	31-55	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	55-80	2-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
Johnstown-----	0-6	18-27	1.25-1.45	0.60-2.00	0.20-0.24	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-23	27-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-2.0	.37	.37			
	23-36	27-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-2.0	.37	.37			
	36-42	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.5-2.0	.43	.43			
	42-58	8-20	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	58-80	2-5	1.60-1.80	20.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
Altvan-----	0-5	18-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	5-10	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	10-17	25-35	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-24	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	24-30	18-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	30-80	0-3	1.65-1.85	20.00-20.00	0.02-0.04	0.0-0.0	0.0-0.5	.10	.15			
6817:												
Scoville-----	0-6	3-15	1.35-1.55	6.00-20.00	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	5	2	134
	6-10	3-15	1.55-1.75	6.00-20.00	0.10-0.12	0.0-1.0	0.0-0.5	.15	.15			
	10-42	2-7	1.60-1.80	6.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
	42-46	8-18	1.40-1.65	0.60-2.00	0.16-0.18	0.0-1.0	0.0-0.5	.24	.24			
	46-60	3-15	1.55-1.75	6.00-20.00	0.08-0.10	0.0-1.0	0.0-0.5	.15	.15			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								K	Kf	T		
	In	Pct	g/cc	in/hr	In/in	Pct	Pct					
6930: Sidney-----	0-11	15-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	11-17	15-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	17-29	10-18	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.5-1.0	.37	.37			
	29-48	10-18	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.5-1.0	.37	.37			
	48-60	---	---	0.20-0.60	---	---	---	---	---			
6937: Sidney-----	0-11	15-27	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	11-17	15-27	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	17-29	10-18	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.5-1.0	.37	.37			
	29-48	10-18	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.5-1.0	.37	.37			
	48-60	---	---	0.20-0.60	---	---	---	---	---			
Canyon-----	0-5	10-25	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	5-10	10-18	1.40-1.60	0.60-2.00	0.16-0.18	0.0-1.0	0.5-2.0	.20	.37			
	10-60	---	---	0.20-0.60	---	---	---	---	---			
7120: Sulco, moderately eroded-----	0-5	10-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	0.5-2.0	.37	.37	5	4L	86
	5-16	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	16-26	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	26-60	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
McConaughy, moderately eroded-----	0-7	7-18	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	7-18	10-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	18-28	5-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.0-0.5	.43	---			
	28-60	5-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.0-0.5	.43	---			
7121: Sulco, moderately eroded-----	0-5	10-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	0.5-2.0	.37	.37	5	4L	86
	5-16	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	16-26	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	26-60	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
McConaughy, moderately eroded-----	0-7	7-18	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	7-18	10-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	18-28	5-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.0-0.5	.43	---			
	28-60	5-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.0-0.5	.43	---			
7122: Sulco, moderately eroded-----	0-5	10-20	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	0.5-2.0	.37	.37	5	4L	86
	5-16	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	16-26	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	26-60	10-20	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
McConaughy, moderately eroded-----	0-7	7-18	1.25-1.45	0.60-2.00	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	7-18	10-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.5-1.0	.43	.43			
	18-28	5-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.0-0.5	.43	---			
	28-60	5-18	1.45-1.65	0.60-2.00	0.17-0.19	0.0-2.9	0.0-0.5	.43	---			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								K	Kf	T		
	In	Pct	g/cc	in/hr	In/in	Pct	Pct					
7582: Valent-----	0-4	2-8	1.40-1.60	6.00-20.00	0.07-0.09	0.0-0.0	0.5-1.0	.15	.15	5	1	250
	4-60	2-8	1.60-1.80	6.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
7586: Valent-----	0-4	2-8	1.40-1.60	6.00-20.00	0.07-0.09	0.0-0.0	0.5-1.0	.15	.15	5	1	250
	4-60	2-8	1.60-1.80	6.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
7588: Valent, rolling-	0-4	2-8	1.40-1.60	6.00-20.00	0.07-0.09	0.0-0.0	0.5-1.0	.15	.15	5	1	250
	4-60	2-8	1.60-1.80	6.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
Valent, hilly---	0-4	2-8	1.40-1.60	6.00-20.00	0.07-0.09	0.0-0.0	0.5-1.0	.15	.15	5	1	250
	4-60	2-8	1.60-1.80	6.00-20.00	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			

Table 20.--Chemical Properties of the Soils

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
1130:							
Alliance-----	0-6	10-40	6.6-7.8	0	0	0	0
	6-17	20-30	6.6-7.8	0	0	0	0
	17-24	5.0-20	7.4-8.4	1-10	0	0	0
	24-34	5.0-20	7.4-8.4	1-10	0	0	0
	34-47	5.0-15	7.4-8.4	1-10	0	0	0
	47-54	0.0-5.0	6.6-7.8	0	0	0	0
	54-80	---	---	---	---	---	---
1146:							
Alliance-----	0-6	10-40	6.6-7.8	0	0	0	0
	6-14	20-30	6.6-7.8	0	0	0	0
	14-19	20-30	6.6-7.8	0	0	0	0
	19-25	5.0-20	7.4-8.4	1-10	0	0	0
	25-45	5.0-15	7.4-8.4	1-10	0	0	0
	45-60	---	---	---	---	---	---
Rosebud-----	0-6	10-40	6.6-7.8	0	0	0	0
	6-11	20-30	6.6-7.8	0	0	0	0
	11-17	20-30	6.6-7.8	0	0	0	0
	17-23	5.0-20	7.4-8.4	1-10	0	0	0
	23-30	5.0-15	7.4-8.4	1-10	0	0	0
	30-80	---	---	---	---	---	---
1198:							
Altvan-----	0-7	5.0-20	6.6-7.8	0	0	0	0
	7-12	10-30	6.1-7.8	0	0	0	0
	12-17	10-20	6.6-8.4	0	0	0	0
	17-25	5.0-15	7.4-8.4	1-10	0	0	0
	25-31	0.0-10	7.4-8.4	1-10	0	0	0
	31-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Eckley-----	0-5	10-30	6.6-7.3	0	0	0	0
	5-8	5.0-25	6.6-7.8	0	0	0	0
	8-11	0.0-15	6.6-7.8	0	0	0	0
	11-15	0.0-5.0	6.6-7.8	0-5	0	0	0
	15-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Satanta, sandy substratum----	0-10	10-40	6.6-7.8	0	0	0	0
	10-21	5.0-20	7.4-8.4	0	0	0	0
	21-30	20-30	6.6-7.8	0	0	0	0
	30-37	5.0-15	7.4-8.4	1-10	0	0	0
	37-42	5.0-15	7.4-8.4	1-10	0	0	0
	42-50	0.0-5.0	6.6-7.8	0-5	0	0	0
	50-80	0.0-5.0	6.6-7.8	0-5	0	0	0
1295:							
Ashollow-----	0-3	5.0-20	7.4-8.4	1-5	0	0	0
	3-10	0.0-10	7.4-8.4	1-5	0	0	0
	10-32	0.0-10	7.4-8.4	1-10	0	0	0
	32-60	0.0-10	7.4-8.4	1-10	0	0	0
Tassel-----	0-4	5.0-15	7.4-8.4	2-10	0	0	0
	4-7	0.0-5.0	7.4-8.4	2-10	0	0	0
	7-18	0.0-5.0	7.4-8.4	2-15	0	0	0
	18-60	---	---	---	---	---	---

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
1588:							
Blueridge-----	0-4	0.0-5.0	5.6-7.3	0	0	0	0
	4-40	0.0-0.0	5.6-7.3	0	0	0	0
	40-80	0.0-0.0	5.6-7.3	0	0	0	0
Altvan-----	0-7	10-40	6.1-7.8	0	0	0	0
	7-10	10-25	6.6-7.8	0	0	0	0
	10-20	10-25	6.6-7.8	0	0	0	0
	20-24	5.0-15	7.4-8.4	1-10	0	0	0
	24-30	0.0-10	7.4-8.4	1-10	0	0	0
	30-80	0.0-5.0	7.4-8.4	0-5	0	0	0
1782:							
Broadwater, frequently flooded-----	0-3	0.0-10	6.6-7.8	0-5	0	0	0
	3-9	0.0-5.0	6.6-7.8	0-5	0	0	0
	9-32	0.0-0.0	6.6-7.8	0-5	0	0	0
	32-60	0.0-0.0	6.6-7.8	0-5	0	0	0
1944:							
Calamus, very rarely flooded-	0-7	0.0-10	5.6-7.8	0	0	0	0
	7-14	0.0-5.0	6.1-7.8	0	0	0	0
	14-22	0.0-0.0	6.1-7.8	0	0	0	0
	22-38	0.0-0.0	6.1-7.8	0	0	0	0
	38-58	0.0-0.0	6.1-7.8	0	0	0	0
	58-60	0.0-0.0	6.1-7.8	0	0	0	0
2072:							
Chappell-----	0-7	5.0-25	6.1-7.3	0	0	0	0
	7-17	5.0-25	6.1-7.3	0	0	0	0
	17-25	5.0-15	6.6-7.3	0	0	0	0
	25-30	0.0-15	6.6-7.8	0-5	0	0	0
	30-60	0.0-0.0	6.6-7.8	0-5	0	0	0
Alice-----	0-8	5.0-25	6.6-7.8	0	0	0	0
	8-14	5.0-25	6.6-7.8	0	0	0	0
	14-19	5.0-15	6.6-7.8	0	0	0	0
	19-33	5.0-15	6.6-7.8	0-5	0	0	0
	33-80	5.0-15	6.6-7.8	0-5	0	0	0
Broadwater-----	0-3	0.0-10	6.6-7.8	0-5	0	0	0
	3-9	0.0-5.0	6.6-7.8	0-5	0	0	0
	9-32	0.0-0.0	6.6-7.8	0-5	0	0	0
	32-60	0.0-0.0	6.6-7.8	0-5	0	0	0
2630:							
Duroc-----	0-6	10-40	6.6-7.8	0	0	0	0
	6-14	10-40	6.6-7.8	0	0	0	0
	14-27	10-30	6.6-7.8	0	0	0	0
	27-32	10-30	6.6-7.8	0	0	0	0
	32-42	5.0-25	7.4-8.4	2-10	0	0	0
	42-60	5.0-25	7.4-8.4	2-10	0	0	0
2638:							
Duroc-----	0-12	10-40	6.6-7.8	0	0	0	0
	12-24	10-40	6.6-7.8	0	0	0	0
	24-31	10-30	6.6-7.8	0	0	0	0
	31-37	10-30	6.6-7.8	2-10	0	0	0
	37-46	5.0-25	7.4-8.4	2-10	0	0	0
	46-60	5.0-25	7.4-8.4	2-10	0	0	0

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
2639:							
Duroc-----	0-12	10-40	6.6-7.8	0	0	0	0
	12-24	10-40	6.6-7.8	0	0	0	0
	24-31	10-30	6.6-7.8	0	0	0	0
	31-37	10-30	6.6-7.8	2-10	0	0	0
	37-46	5.0-25	7.4-8.4	2-10	0	0	0
	46-60	5.0-25	7.4-8.4	2-10	0	0	0
3050:							
Glenberg, rarely flooded-----	0-8	5.0-25	7.4-8.4	0-5	0	0	0
	8-60	0.0-15	7.4-8.4	1-10	0	0	0
3140:							
Gothenburg, occasionally flooded-----	0-5	0.0-10	6.6-8.4	0-5	0	0	0
	5-14	0.0-0.0	6.6-8.4	0-5	0	0	0
	14-60	0.0-0.0	6.6-7.8	0	0	0	0
3952:							
Jankosh-----	0-2	10-40	7.4-8.4	1-15	0	2.0-16.0	0-9
	2-4	10-30	7.4-8.4	1-15	0	2.0-16.0	0-9
	4-14	10-30	8.5-9.6	5-15	0	4.0-16.0	13-30
	14-18	10-30	8.5-9.6	5-15	0	4.0-16.0	13-30
	18-33	5.0-15	8.5-9.6	5-15	0	4.0-16.0	13-30
	33-60	0.0-2.0	6.6-7.3	0-5	0	0.0-2.0	0-6
4028:							
Jayem-----	0-6	5.0-25	6.6-7.8	0	0	0	0
	6-9	5.0-15	6.6-7.8	0	0	0	0
	9-22	5.0-15	6.6-7.8	0	0	0	0
	22-50	5.0-15	6.6-7.8	0-2	0	0	0
	50-60	5.0-15	6.6-7.8	0-2	0	0	0
4070:							
Johnstown-----	0-9	10-40	6.6-7.3	0	0	0	0
	9-25	20-50	6.1-7.8	0	0	0	0
	25-29	20-50	6.1-7.8	0	0	0	0
	29-35	10-30	6.6-8.4	1-10	0	0	0
	35-46	5.0-15	7.4-8.4	1-10	0	0	0
	46-60	0.0-0.0	6.6-7.8	0-5	0	0	0
Satanta, sandy substratum-----	0-8	10-40	6.6-7.8	0	0	0	0
	8-25	20-30	6.6-7.8	0	0	0	0
	25-32	10-30	6.6-8.4	0-10	0	0	0
	32-52	5.0-15	7.4-8.4	1-10	0	0	0
	52-60	0.0-5.0	6.6-7.8	0	0	0	0
Richfield-----	0-7	10-40	6.6-7.8	0	0	0	0
	7-12	55-100	6.1-7.8	0	0	0	0
	12-17	20-50	6.1-7.8	0	0	0	0
	17-21	5.0-20	7.4-8.4	0	0	0	0
	21-32	5.0-20	7.4-8.4	1-10	0	0	0
	32-42	5.0-20	7.4-8.4	1-10	0	0	0
	42-48	0.0-15	6.1-8.4	1-10	0	0	0
	48-78	0.0-15	6.1-8.4	1-10	0	0	0
	78-80	0.0-5.0	7.4-8.4	0-5	0	0	0

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
4151:							
Keith-----	0-6	10-40	6.6-7.3	0	0	0	0
	6-13	10-40	6.6-7.3	0	0	0	0
	13-22	20-30	6.6-7.8	0	0	0	0
	22-31	10-20	6.6-7.8	0	0	0	0
	31-48	10-20	7.4-8.4	1-10	0	0	0
	48-60	0.0-15	7.4-8.4	1-10	0	0	0
4152:							
Keith-----	0-7	10-40	6.6-7.3	0	0	0	0
	7-14	20-30	6.6-7.8	0	0	0	0
	14-19	10-20	6.6-7.8	0	0	0	0
	19-25	5.0-20	7.4-8.4	1-10	0	0	0
	25-60	5.0-20	7.4-8.4	1-10	0	0	0
4310:							
Kuma-----	0-7	10-40	6.6-7.8	0	0	0	0
	7-17	10-40	6.6-7.8	0	0	0	0
	17-24	10-30	6.6-7.8	0	0	0	0
	24-37	10-30	6.6-7.8	0	0	0	0
	37-44	5.0-15	6.6-8.4	1-10	0	0	0
	44-60	5.0-15	7.2-8.4	1-10	0	0	0
4311:							
Kuma-----	0-6	10-40	6.6-7.8	0	0	0	0
	6-10	20-50	6.1-7.8	0	0	0	0
	10-23	20-50	6.1-7.8	0	0	0	0
	23-33	20-50	6.1-7.8	0	0	0	0
	33-41	5.0-20	7.4-8.4	1-10	0	0	0
	41-60	5.0-15	7.2-8.4	1-10	0	0	0
4472:							
Las Animas, frequently flooded-----	0-5	10-40	7.4-8.4	1-10	0	0.0-4.0	0
	5-11	5.0-15	7.4-8.4	1-10	0	0.0-4.0	0
	11-33	5.0-15	7.4-8.4	1-10	0	0.0-4.0	0
	33-60	5.0-15	7.4-8.4	1-10	0	0.0-4.0	0
4475:							
Las Animas, occasionally flooded-----	0-5	10-40	7.4-8.4	1-10	0	0.0-4.0	0
	5-11	5.0-15	7.4-8.4	1-10	0	0.0-4.0	0
	11-33	5.0-15	7.4-8.4	1-10	0	0.0-4.0	0
	33-60	5.0-15	7.4-8.4	1-10	0	0.0-4.0	0
4592:							
Lexsworth, very rarely flooded-	0-12	10-40	7.4-8.4	0-5	0	2.0-4.0	1-4
	12-19	5.0-20	7.4-8.4	2-9	0	4.0-8.0	2-6
	19-26	0.0-15	7.4-8.4	1-8	0	4.0-8.0	2-6
	26-33	0.0-0.0	7.4-8.4	0	0	4.0-8.0	2-6
	33-52	0.0-0.0	7.4-8.4	0	0	0	0
	52-60	0.0-0.0	7.4-8.4	0	0	0	0
	60-80	0.0-0.0	7.4-8.4	0	0	0	0

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
4655: Lodgepole, ponded-----	0-5	25-55	6.1-7.8	0	0	0	0
	5-14	55-100	6.1-7.8	0	0	0	0
	14-26	55-100	6.1-7.8	0	0	0	0
	26-32	20-55	6.1-7.8	0	0	0	0
	32-48	5.0-20	6.6-8.4	0-10	0	0	0
	48-60	5.0-20	6.6-8.4	0-10	0	0	0
5212: Merrick, very rarely flooded-	0-12	25-50	6.6-7.8	0-5	0	0.0-2.0	0
	12-27	20-40	6.6-7.8	0-5	0	0.0-2.0	0
	27-38	20-40	7.4-7.8	1-5	0	0.0-2.0	0
	38-42	5.0-20	7.4-8.4	5-10	0	0.0-2.0	0
	42-53	5.0-20	7.4-8.4	5-10	0	0.0-2.0	0
	53-64	0.0-15	7.4-8.4	5-10	0	0.0-2.0	0
	64-80	0.0-15	7.4-8.4	5-10	0	0.0-2.0	0
6132: Platte, occasionally flooded-----	0-5	10-40	6.6-8.4	0-10	0	0.0-2.0	0
	5-11	5.0-15	6.6-8.4	0-5	0	0.0-2.0	0
	11-18	5.0-15	6.6-8.4	0-5	0	0.0-2.0	0
	18-60	0.0-0.0	6.6-8.4	0-5	0	0.0-2.0	0
6248: Ralton, very rarely flooded-	0-6	10-40	7.4-8.4	1-10	0	0	0
	6-14	10-40	7.4-8.4	1-10	0	0	0
	14-24	5.0-15	7.4-8.4	1-10	0	0	0
	24-34	5.0-15	7.4-8.4	1-10	0	0	0
	34-51	5.0-20	7.4-8.4	1-10	0	0	0
	51-71	5.0-15	7.4-8.4	1-10	0	0	0
	71-80	0.0-0.0	7.4-8.4	1-10	0	0	0
6625: Sarben-----	0-7	0.0-10	6.1-7.3	0	0	0	0
	7-15	5.0-15	6.1-7.3	0	0	0	0
	15-32	5.0-15	6.6-7.8	0-5	0	0	0
	32-60	5.0-15	6.6-7.8	0-5	0	0	0
6626: Sarben-----	0-7	0.0-10	6.1-7.3	0	0	0	0
	7-15	5.0-15	6.1-7.3	0	0	0	0
	15-32	5.0-15	6.6-7.8	0-5	0	0	0
	32-60	5.0-15	6.6-7.8	0-5	0	0	0
6722: Satanta-----	0-6	5.0-15	7.4-8.4	0	0	0	0
	6-13	20-30	6.6-7.8	0	0	0	0
	13-19	20-30	6.6-7.8	0	0	0	0
	19-26	5.0-15	7.4-8.4	1-10	0	0	0
	26-52	5.0-15	7.4-8.4	1-10	0	0	0
	52-76	0.0-10	6.6-7.8	0-1	0	0	0
Altvan-----	0-5	5.0-20	6.6-7.8	0	0	0	0
	5-10	10-20	6.6-8.4	0	0	0	0
	10-14	10-20	6.6-8.4	0	0	0	0
	14-24	10-20	7.4-8.4	1-10	0	0	0
	24-38	5.0-15	7.4-8.4	1-10	0	0	0
	38-80	0.0-0.0	7.4-8.4	0-5	0	0	0

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
6725:							
Satanta, sandy substratum-----	0-9	10-40	6.6-7.8	0	0	0	0
	9-14	10-40	6.6-7.8	0	0	0	0
	14-26	20-30	6.6-7.8	0	0	0	0
	26-31	10-30	6.6-8.4	0-10	0	0	0
	31-55	5.0-15	7.4-8.4	1-10	0	0	0
	55-80	0.0-5.0	6.6-7.8	0	0	0	0
Ascalon-----	0-6	5.0-20	6.6-7.8	0	0	0	0
	6-19	10-25	6.6-7.8	0	0	0	0
	19-35	5.0-15	7.4-8.4	0-5	0	0	0
	35-40	5.0-15	7.4-8.4	1-10	0	0	0
	40-46	0.0-10	7.4-8.4	1-10	0	0	0
	46-80	0.0-5.0	7.4-8.4	1-5	0	0	0
6727:							
Satanta, sandy substratum-----	0-9	10-40	6.6-7.8	0	0	0	0
	9-14	10-40	6.6-7.8	0	0	0	0
	14-26	20-30	6.6-7.8	0	0	0	0
	26-31	10-30	6.6-8.4	0-10	0	0	0
	31-55	5.0-15	7.4-8.4	1-10	0	0	0
	55-80	0.0-5.0	6.6-7.8	0	0	0	0
Johnstown-----	0-6	10-40	6.6-7.3	0	0	0	0
	6-23	20-30	6.6-7.8	0	0	0	0
	23-36	20-30	6.6-7.8	0	0	0	0
	36-42	5.0-15	7.4-8.4	1-10	0	0	0
	42-58	5.0-15	7.4-8.4	1-10	0	0	0
	58-80	0.0-5.0	6.6-7.8	0	0	0	0
Altvan-----	0-5	10-40	6.1-7.8	0	0	0	0
	5-10	10-20	6.6-8.4	0	0	0	0
	10-17	10-20	6.6-8.4	0	0	0	0
	17-24	10-20	7.4-8.4	1-10	0	0	0
	24-30	10-20	7.4-8.4	1-10	0	0	0
	30-80	0.0-0.0	7.4-8.4	1-5	0	0	0
6817:							
Scoville-----	0-6	0.0-10	6.1-7.8	0-1	0	0	0
	6-10	0.0-10	6.6-7.8	0-1	0	0	0
	10-42	0.0-5.0	6.6-7.8	0-1	0	0	0
	42-46	0.0-20	7.4-8.4	1-5	0	0	0
	46-60	0.0-10	6.6-7.8	0-1	0	0	0
6930:							
Sidney-----	0-11	10-40	6.6-7.8	0-5	0	0	0
	11-17	5.0-20	6.6-7.8	1-10	0	0	0
	17-29	5.0-15	7.4-8.4	1-10	0	0	0
	29-48	5.0-15	7.4-8.4	1-10	0	0	0
	48-60	---	---	---	---	---	---
6937:							
Sidney-----	0-11	10-40	6.6-7.8	0-5	0	0	0
	11-17	5.0-20	6.6-7.8	1-10	0	0	0
	17-29	5.0-15	7.4-8.4	1-10	0	0	0
	29-48	5.0-15	7.4-8.4	1-10	0	0	0
	48-60	---	---	---	---	---	---
Canyon-----	0-5	10-20	7.4-8.4	1-10	0	0	0
	5-10	5.0-20	7.4-8.4	1-10	0	0	0
	10-60	---	---	---	---	---	---

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
7120: Sulco, moderately eroded-----	0-5	10-30	7.4-8.4	1-5	0	0	0
	5-16	10-30	7.4-8.4	5-10	0	0	0
	16-26	5.0-20	7.4-8.4	5-10	0	0	0
	26-60	5.0-20	7.4-8.4	5-10	0	0	0
McConaughy, moderately eroded-----	0-7	10-30	6.6-7.8	0	0	0	0
	7-18	10-30	6.6-7.8	0	0	0	0
	18-28	5.0-20	7.4-8.4	1-10	0	0	0
	28-60	5.0-20	7.4-8.4	1-10	0	0	0
7121: Sulco, moderately eroded-----	0-5	10-30	7.4-8.4	1-5	0	0	0
	5-16	10-30	7.4-8.4	5-10	0	0	0
	16-26	5.0-20	7.4-8.4	5-10	0	0	0
	26-60	5.0-20	7.4-8.4	5-10	0	0	0
McConaughy, moderately eroded-----	0-7	10-30	6.6-7.8	0	0	0	0
	7-18	10-30	6.6-7.8	0	0	0	0
	18-28	5.0-20	7.4-8.4	1-10	0	0	0
	28-60	5.0-20	7.4-8.4	1-10	0	0	0
7122: Sulco, moderately eroded-----	0-5	10-30	7.4-8.4	1-5	0	0	0
	5-16	10-30	7.4-8.4	5-10	0	0	0
	16-26	5.0-20	7.4-8.4	5-10	0	0	0
	26-60	5.0-20	7.4-8.4	5-10	0	0	0
McConaughy, moderately eroded-----	0-7	10-30	6.6-7.8	0	0	0	0
	7-18	10-30	6.6-7.8	0	0	0	0
	18-28	5.0-20	7.4-8.4	1-10	0	0	0
	28-60	5.0-20	7.4-8.4	1-10	0	0	0
7582: Valent-----	0-4	0.0-5.0	6.6-7.8	0	0	0	0
	4-60	0.0-0.0	6.6-7.8	0	0	0	0
7586: Valent-----	0-4	0.0-5.0	6.6-7.8	0	0	0	0
	4-60	0.0-0.0	6.6-7.8	0	0	0	0
7588: Valent, rolling-	0-4	0.0-5.0	6.6-7.8	0	0	0	0
	4-60	0.0-0.0	6.6-7.8	0	0	0	0
Valent, hilly---	0-4	0.0-5.0	6.6-7.8	0	0	0	0
	4-60	0.0-0.0	6.6-7.8	0	0	0	0

Table 21.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Depth to top	Kind	Hardness		Uncoated steel	Concrete
	In					
1130: Alliance-----	40-60	Bedrock (paralithic)	Weakly cemented	Moderate	Moderate	Low
1146: Alliance-----	40-60	Bedrock (paralithic)	Weakly cemented	Moderate	Moderate	Low
Rosebud-----	20-40	Bedrock (paralithic)	Weakly cemented	Moderate	High	Low
1198: Altvan-----	---	---	---	Moderate	Low	Low
Eckley-----	---	---	---	Low	Moderate	Low
Satanta, sandy substratum-	---	---	---	Moderate	Low	Low
1295: Ashollow-----	---	---	---	Low	Low	Low
Tassel-----	6-20	Bedrock (paralithic)	Moderately cemented	Low	High	Low
1588: Blueridge-----	---	---	---	Low	Low	Low
Altvan-----	---	---	---	Moderate	Low	Low
1782: Broadwater, frequently flooded-----	---	---	---	Low	Low	Low
1944: Calamus, very rarely flooded-----	---	---	---	Low	Low	Low
2072: Chappell-----	---	---	---	Low	Low	Low
Alice-----	---	---	---	Moderate	Low	Low
Broadwater-----	---	---	---	Low	Low	Low
2630: Duroc-----	---	---	---	Low	Low	Low
2638: Duroc-----	---	---	---	Low	Low	Low
2639: Duroc-----	---	---	---	Low	Low	Low
3050: Glenberg, rarely flooded--	---	---	---	Moderate	Low	Low
3140: Gothenburg, occasionally flooded-----	---	---	---	Moderate	Moderate	Low

Table 21.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Depth to top	Kind	Hardness		Uncoated steel	Concrete
	In					
3952: Jankosh-----	---	---	---	Moderate	High	High
4028: Jayem-----	---	---	---	Low	Moderate	Low
4070: Johnstown-----	---	---	---	Moderate	Moderate	Low
Satanta, sandy substratum-----	---	---	---	Moderate	Low	Low
Richfield-----	---	---	---	Low	High	Low
4151: Keith-----	---	---	---	Moderate	Moderate	Low
4152: Keith-----	---	---	---	Moderate	Moderate	Low
4310: Kuma-----	---	---	---	Moderate	High	Moderate
4311: Kuma-----	---	---	---	Moderate	High	Moderate
4472: Las Animas, frequently flooded-----	---	---	---	High	High	Moderate
4475: Las Animas, occasionally flooded-----	---	---	---	High	High	Moderate
4592: Lexsworth, very rarely flooded-----	---	---	---	High	Moderate	Low
4655: Lodgepole, ponded-----	---	---	---	High	High	Low
5212: Merrick, very rarely flooded-----	---	---	---	Moderate	Low	Low
6132: Platte, occasionally flooded-----	---	---	---	Moderate	High	Moderate
6248: Ralton, very rarely flooded-----	---	---	---	Moderate	High	Low
6625: Sarben-----	---	---	---	Low	High	Low
6626: Sarben-----	---	---	---	Low	High	Low
6722: Satanta-----	---	---	---	Moderate	Low	Low
Altvan-----	---	---	---	Moderate	Low	Low

Table 21.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Depth to top	Kind	Hardness		Uncoated steel	Concrete
	In					
6725: Satanta, sandy substratum-	---	---	---	Moderate	Low	Low
Ascalon-----	---	---	---	Moderate	Moderate	Low
6727: Satanta, sandy substratum-	---	---	---	Moderate	Low	Low
Johnstown-----	---	---	---	Moderate	Moderate	Low
Altvan-----	---	---	---	Moderate	Low	Low
6817: Scoville-----	---	---	---	Low	High	Low
6930: Sidney-----	40-60	Bedrock (paralithic)	Weakly cemented	Moderate	High	Low
6937: Sidney-----	40-60	Bedrock (paralithic)	Weakly cemented	Moderate	High	Low
Canyon-----	6-20	Bedrock (paralithic)	Weakly cemented	Low	Low	Low
7120: Sulco, moderately eroded--	---	---	---	Low	High	Low
McConaughy, moderately eroded-----	---	---	---	Moderate	High	Moderate
7121: Sulco, moderately eroded--	---	---	---	Low	High	Low
McConaughy, moderately eroded-----	---	---	---	Moderate	High	Moderate
7122: Sulco, moderately eroded--	---	---	---	Low	High	Low
McConaughy, moderately eroded-----	---	---	---	Moderate	High	Moderate
7582: Valent-----	---	---	---	Low	Moderate	Low
7586: Valent-----	---	---	---	Low	Moderate	Low
7588: Valent, rolling-----	---	---	---	Low	Moderate	Low
Valent, hilly-----	---	---	---	Low	Moderate	Low

Table 22.--Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro- logic group	Months	Soil saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
1130: Alliance-----	B	---	---	---	---	---	---	---	---
1146: Alliance-----	B	---	---	---	---	---	---	---	---
Rosebud-----	B	---	---	---	---	---	---	---	---
1198: Altvan-----	B	---	---	---	---	---	---	---	---
Eckley-----	B	---	---	---	---	---	---	---	---
Satanta, sandy substratum-	B	---	---	---	---	---	---	---	---
1295: Ashollow-----	B	---	---	---	---	---	---	---	---
Tassel-----	D	---	---	---	---	---	---	---	---
1588: Blueridge-----	A	---	---	---	---	---	---	---	---
Altvan-----	B	---	---	---	---	---	---	---	---
1782: Broadwater, frequently flooded-----	A	March April May June July August	---	---	---	---	None None None None None None	Very brief Very brief Very brief Very brief Very brief Very brief	Frequent Frequent Frequent Frequent Frequent Frequent
1944: Calamus, very rarely flooded-----	A	February March April May June July August September October November December	3.0-6.0 3.0-6.0 3.0-6.0 3.0-6.0 3.0-6.0 3.0-6.0 3.0-6.0 3.0-6.0 3.0-6.0 3.0-6.0 3.0-6.0	>6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0	--- --- --- --- --- --- --- --- --- --- ---	--- --- --- --- --- --- --- --- --- --- ---	None None None None None None None None None None None	Very brief Very brief Very brief Very brief --- --- --- --- --- --- ---	Very rare Very rare Very rare Very rare None None None None None None None

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Months	Soil saturation		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
2072: Chappell-----	A	---	---	---	---	---	---	---	---
Alice-----	B	---	---	---	---	---	---	---	---
Broadwater-----	A	March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
2630: Duroc-----	B	---	---	---	---	---	---	---	---
2638: Duroc-----	B	---	---	---	---	---	---	---	---
2639: Duroc-----	B	---	---	---	---	---	---	---	---
3050: Glenberg, rarely flooded--	B	March	---	---	---	---	None	Very brief	Rare
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
3140: Gothenburg, occasionally flooded-----	D	January	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		February	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		March	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		April	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		May	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		June	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		July	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		August	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		September	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		October	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		November	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		December	0.0-1.5	>6.0	---	---	None	Brief	Occasional
3952: Jankosh-----	C	January	1.5-3.0	>6.0	---	---	None	Brief	Rare
		February	1.5-3.0	>6.0	---	---	None	Brief	Rare
		March	1.5-3.0	>6.0	---	---	None	Brief	Rare
		April	1.5-3.0	>6.0	---	---	None	Brief	Rare
		May	1.5-3.0	>6.0	---	---	None	Brief	Rare
		June	1.5-3.0	>6.0	---	---	None	Brief	Rare
		July	1.5-3.0	>6.0	---	---	None	Brief	Rare
		August	1.5-3.0	>6.0	---	---	None	Brief	Rare
		September	1.5-3.0	>6.0	---	---	None	Brief	Rare
		October	1.5-3.0	>6.0	---	---	None	Brief	Rare
		November	1.5-3.0	>6.0	---	---	None	Brief	Rare
		December	1.5-3.0	>6.0	---	---	None	Brief	Rare

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Months	Soil saturation		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
4028: Jayem-----	B	---	---	---	---	---	---	---	---
4070: Johnstown-----	B	---	---	---	---	---	---	---	---
Satanta, sandy substratum-	B	---	---	---	---	---	---	---	---
Richfield-----	B	---	---	---	---	---	---	---	---
4151: Keith-----	B	---	---	---	---	---	---	---	---
4152: Keith-----	B	---	---	---	---	---	---	---	---
4310: Kuma-----	B	---	---	---	---	---	---	---	---
4311: Kuma-----	B	---	---	---	---	---	---	---	---
4472: Las Animas, frequently flooded-----	D	January February March April May June July August September October November December	0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5 0.0-1.5	>6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0	--- --- --- --- --- --- --- --- --- --- --- ---	--- --- --- --- --- --- --- --- --- --- --- ---	None None None None None None None None None None None None	--- Brief Brief Brief Brief Brief Brief --- --- --- --- ---	None Frequent Frequent Frequent Frequent Frequent Frequent None None None None None
4475: Las Animas, occasionally flooded-----	D	January February March April May June July August September October November December	1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0 1.5-3.0	>6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0 >6.0	--- --- --- --- --- --- --- --- --- --- --- ---	--- --- --- --- --- --- --- --- --- --- --- ---	None None None None None None None None None None None None	--- Brief Brief Brief Brief Brief Brief --- --- --- --- ---	None Occasional Occasional Occasional Occasional Occasional Occasional None None None None None

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Months	Soil saturation		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
4592: Lexsworth, very rarely flooded-----	B	January	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		February	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		March	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		April	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		May	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		June	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		July	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		August	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		September	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		October	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		November	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
		December	5.0-8.0	>6.0	---	---	None	Very brief	Very rare
4655: Lodgepole, ponded-----	D	March	0.0	>6.0	0.5-1.0	Brief	Occasional	---	None
		April	0.0	>6.0	0.5-1.0	Brief	Occasional	---	None
		May	0.0	>6.0	0.5-1.0	Brief	Occasional	---	None
		June	0.0	>6.0	0.5-1.0	Brief	Occasional	---	None
		July	0.0	>6.0	0.5-1.0	Brief	Occasional	---	None
		August	---	---	0.5-1.0	Brief	Occasional	---	None
		September	---	---	0.5-1.0	Brief	Occasional	---	None
5212: Merrick, very rarely flooded-----	B	January	4.0-6.0	>6.0	---	---	None	Very brief	Very rare
		February	4.0-6.0	>6.0	---	---	None	Very brief	Very rare
		March	4.0-6.0	>6.0	---	---	None	Very brief	Very rare
		April	4.0-6.0	>6.0	---	---	None	Very brief	Very rare
		May	4.0-6.0	>6.0	---	---	None	Very brief	Very rare
		June	4.0-6.0	>6.0	---	---	None	---	None
		July	4.0-6.0	>6.0	---	---	None	---	None
		August	4.0-6.0	>6.0	---	---	None	---	None
		September	4.0-6.0	>6.0	---	---	None	---	None
		October	4.0-6.0	>6.0	---	---	None	---	None
		November	4.0-6.0	>6.0	---	---	None	---	None
		December	4.0-6.0	>6.0	---	---	None	---	None
6132: Platte, occasionally flooded-----	B	January	1.0-3.0	>6.0	---	---	None	---	None
		February	1.0-3.0	>6.0	---	---	None	Brief	Occasional
		March	1.0-3.0	>6.0	---	---	None	Brief	Occasional
		April	1.0-3.0	>6.0	---	---	None	Brief	Occasional
		May	1.0-3.0	>6.0	---	---	None	Brief	Occasional
		June	1.0-3.0	>6.0	---	---	None	Brief	Occasional
		July	1.0-3.0	>6.0	---	---	None	Brief	Occasional
		August	1.0-3.0	>6.0	---	---	None	---	None
		September	1.0-3.0	>6.0	---	---	None	---	None
		October	1.0-3.0	>6.0	---	---	None	---	None
		November	1.0-3.0	>6.0	---	---	None	---	None
		December	1.0-3.0	>6.0	---	---	None	---	None

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Months	Soil saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
6248: Ralton, very rarely flooded-----	B		Ft	Ft	Ft				
		January	3.0-6.0	>6.0	---	---	None	---	None
		February	3.0-6.0	>6.0	---	---	None	Very brief	Very rare
		March	3.0-6.0	>6.0	---	---	None	Very brief	Very rare
		April	3.0-6.0	>6.0	---	---	None	Very brief	Very rare
		May	3.0-6.0	>6.0	---	---	None	Very brief	Very rare
		June	3.0-6.0	>6.0	---	---	None	Very brief	Very rare
		July	3.0-6.0	>6.0	---	---	None	Very brief	Very rare
		August	3.0-6.0	>6.0	---	---	None	---	None
		September	3.0-6.0	>6.0	---	---	None	---	None
		October	3.0-6.0	>6.0	---	---	None	---	None
		November	3.0-6.0	>6.0	---	---	None	---	None
		December	3.0-6.0	>6.0	---	---	None	---	None
6625: Sarben-----	B	---	---	---	---	---	---	---	---
6626: Sarben-----	B	---	---	---	---	---	---	---	---
6722: Satanta-----	B	---	---	---	---	---	---	---	---
Altvan-----	B	---	---	---	---	---	---	---	---
6725: Satanta, sandy substratum-	B	---	---	---	---	---	---	---	---
Ascalon-----	B	---	---	---	---	---	---	---	---
6727: Satanta, sandy substratum-	B	---	---	---	---	---	---	---	---
Johnstown-----	B	---	---	---	---	---	---	---	---
Altvan-----	B	---	---	---	---	---	---	---	---
6817: Scoville-----	A	---	---	---	---	---	---	---	---
6930: Sidney-----	B	---	---	---	---	---	---	---	---
6937: Sidney-----	B	---	---	---	---	---	---	---	---
Canyon-----	D	---	---	---	---	---	---	---	---
7120: Sulco, moderately eroded--	B	---	---	---	---	---	---	---	---
McConaughy, moderately eroded-----	B	---	---	---	---	---	---	---	---
7121: Sulco, moderately eroded--	B	---	---	---	---	---	---	---	---
McConaughy, moderately eroded-----	B	---	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

[illegible]

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# Glossary

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**ABC soil.** A soil having an A, a B, and a C horizon.

**Ablation till.** Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

**AC soil.** A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alkali (sodic) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Alluvial cone.** The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

**Alluvial fan.** The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

**Animal unit month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redoximorphic features.

**Argillic horizon.** A subsoil horizon characterized by an accumulation of illuvial clay.

**Arroyo.** The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

**Aspect.** The direction in which a slope faces.

**Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low .....	0 to 3
Low .....	3 to 6
Moderate .....	6 to 9
High .....	9 to 12
Very high .....	more than 12

**Backslope.** The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

**Badland.** Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

**Basal area.** The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Basal till.** Compact glacial till deposited beneath the ice.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with

exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Base slope.** A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Bedding planes.** Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

**Bedding system.** A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock-controlled topography.** A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Bisequum.** Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

**Blowout.** A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Breaks.** The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

**Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Brush management.** Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the

hazard of erosion. It can improve the habitat for some species of wildlife.

**Butte.** An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

**Cable yarding.** A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Caliche.** A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Canyon.** A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

**Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Catena.** A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

**Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Catsteps.** Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

**Cement rock.** Shaly limestone used in the manufacture of cement.

**Channery soil material.** Soil material that has, by volume, 15 to 35 percent thin, flat fragments of

sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

**Chemical treatment.** Control of unwanted vegetation through the use of chemicals.

**Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay depletions.** Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

**Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Coarse textured soil.** Sand or loamy sand.

**Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material.** Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

**COLE (coefficient of linear extensibility).** See Linear extensibility.

**Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

**Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping.

The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions.** Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

**Congeliturbate.** Soil material disturbed by frost action.

**Conglomerate.** A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

**Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Conservation tillage.** A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

**Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

**Contour stripcropping.** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that

part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Coppice dune.** A small dune of fine grained soil material stabilized around shrubs or small trees.

**Coprogenous earth (sedimentary peat).** Fecal material deposited in water by aquatic organisms.

**Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Cuesta.** A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Dense layer** (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

**Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

**Dip slope.** A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

**Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Divided-slope farming.** A form of field stripcropping in which crops are grown in a systematic

arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

**Drainage class** (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the “Soil Survey Manual.”

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**Draw.** A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

**Drumlin.** A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

**Duff.** A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

**Ecological site.** An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

**Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

**Eolian soil material.** Earthy parent material

accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

**Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

**Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

**Esker.** A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

**Extrusive rock.** Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

**Fallow.** Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

**Fan terrace.** A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

**Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

**Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large

amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

**Fill slope.** A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

**Fine textured soil.** Sandy clay, silty clay, or clay.

**Firebreak.** Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Flaggy soil material.** Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

**Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.

**Foothill.** A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

**Footslope.** The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

**Forb.** Any herbaceous plant not a grass or a sedge.

**Forest cover.** All trees and other woody plants (underbrush) covering the ground in a forest.

**Forest type.** A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

**Fragipan.** A loamy, brittle subsurface horizon low in

porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Gilgai.** Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

**Glacial drift.** Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

**Glacial outwash.** Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

**Glacial till.** Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

**Glaciofluvial deposits.** Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

**Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

**Graded stripcropping.** Growing crops in strips that grade toward a protected waterway.

**Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

**Green manure crop** (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water.** Water filling all the unblocked pores of the material below the water table.

**Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Hard to reclaim** (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Head out.** To form a flower head.

**Head slope.** A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Soft, consolidated bedrock beneath the soil.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally,

material is removed from an upper horizon and deposited in a lower horizon.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Increasesers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2 .....	very low
0.2 to 0.4 .....	low
0.4 to 0.75 .....	moderately low
0.75 to 1.25 .....	moderate
1.25 to 1.75 .....	moderately high
1.75 to 2.5 .....	high
More than 2.5 .....	very high

**Interfluv.** An elevated area between two drainageways that sheds water to those drainageways.

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Iron depletions.** Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay

content similar to that of the adjacent matrix. A type of redoximorphic depletion.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:

*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Kame.** An irregular, short ridge or hill of stratified glacial drift.

**Karst** (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

**Knoll.** A small, low, rounded hill rising above adjacent landforms.

**K<sub>sat</sub>.** Saturated hydraulic conductivity. (See Permeability.)

**Lacustrine deposit.** Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones** (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at  $1/3$ - or  $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loess.** Fine grained material, dominantly of silt-sized particles, deposited by wind.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength.** The soil is not strong enough to support loads.

**Marl.** An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Mesa.** A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition,

or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Moraine.** An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

**Mountain.** A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

**Muck.** Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

**Mudstone.** Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Natric horizon.** A special kind of argillic horizon that contains enough exchangeable sodium to have an

adverse effect on the physical condition of the subsoil.

**Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nodules.** Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

**Nose slope.** A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low .....	less than 0.5 percent
Low .....	0.5 to 1.0 percent
Moderately low .....	1.0 to 2.0 percent
Moderate .....	2.0 to 4.0 percent
High .....	4.0 to 8.0 percent
Very high .....	more than 8.0 percent

**Outwash plain.** A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

**Paleoterrace.** An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

**Pan.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Peat.** Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedisediment.** A thin layer of alluvial material that

mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

**Pedon.** The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The movement of water through the soil.

**Permafrost.** Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Impermeable .....	less than 0.0015 inch
Very slow .....	0.0015 to 0.06 inch
Slow .....	0.06 to 0.2 inch
Moderately slow .....	0.2 to 0.6 inch
Moderate .....	0.6 inch to 2.0 inches
Moderately rapid .....	2.0 to 6.0 inches
Rapid .....	6.0 to 20 inches
Very rapid .....	more than 20 inches

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Pitting** (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plateau.** An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and

separated from them on one or more sides by escarpments.

**Playa.** The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

**Plinthite.** The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poorly graded.** Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Potential native plant community.** See Climax plant community.

**Potential rooting depth (effective rooting depth).** Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Rangeland.** Land on which the potential natural

vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid .....	less than 3.5
Extremely acid .....	3.5 to 4.4
Very strongly acid .....	4.5 to 5.0
Strongly acid .....	5.1 to 5.5
Moderately acid .....	5.6 to 6.0
Slightly acid .....	6.1 to 6.5
Neutral .....	6.6 to 7.3
Slightly alkaline .....	7.4 to 7.8
Moderately alkaline .....	7.9 to 8.4
Strongly alkaline .....	8.5 to 9.0
Very strongly alkaline .....	9.1 and higher

**Red beds.** Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

**Redoximorphic concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redoximorphic depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redoximorphic features.** Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saprolite.** Unconsolidated residual material underlying the soil and grading to hard bedrock below.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Second bottom.** The first terrace above the normal flood plain (or first bottom) of a river.

**Sedimentary rock.** Rock made up of particles

deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shoulder.** The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

**Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Side slope.** A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silica-sesquioxide ratio.** The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Sinkhole.** A depression in the landscape where limestone has been dissolved.

**Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slick spot.** A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Level .....	0 to 1 percent
Nearly level .....	0 to 2 percent
Very gently sloping .....	0 to 3 percent
Gently sloping .....	3 to 6 percent
Strongly sloping .....	6 to 9 percent
Moderately steep .....	9 to 17 percent
Steep .....	17 to 30 percent
Very steep .....	30 to 60 percent

Classes for complex slopes are as follows:

Undulating .....	3 to 9 percent
Rolling .....	9 to 24 percent
Hilly .....	24 to 60 percent

**Sloughed till.** Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

**Slow refill** (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

**Sodic (alkali) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Sodicity.** The degree to which a soil is affected by

exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of  $\text{Na}^+$  to  $\text{Ca}^{++} + \text{Mg}^{++}$ . The degrees of sodicity and their respective ratios are:

Slight .....	less than 13:1
Moderate .....	13-30:1
Strong .....	more than 30:1

**Sodium adsorption ratio (SAR).** A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

**Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand .....	2.0 to 1.0
Coarse sand .....	1.0 to 0.5
Medium sand .....	0.5 to 0.25
Fine sand .....	0.25 to 0.10
Very fine sand .....	0.10 to 0.05
Silt .....	0.05 to 0.002
Clay .....	less than 0.002

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Strippcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

**Structure, soil.** The arrangement of primary soil

particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summer fallow.** The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

**Summit.** The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**Surface soil.** The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

**Talus.** Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

**Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

**Terminal moraine.** A belt of thick glacial drift that

generally marks the termination of important glacial advances.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace** (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

**Thin layer** (in tables). Otherwise suitable soil material that is too thin for the specified use.

**Till plain.** An extensive area of nearly level to undulating soils underlain by glacial till.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toeslope.** The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Tuff.** A compacted deposit that is 50 percent or more volcanic ash and dust.

**Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Valley fill.** In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

**Variation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Varve.** A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow.** The uprooting and tipping over of trees by the wind.

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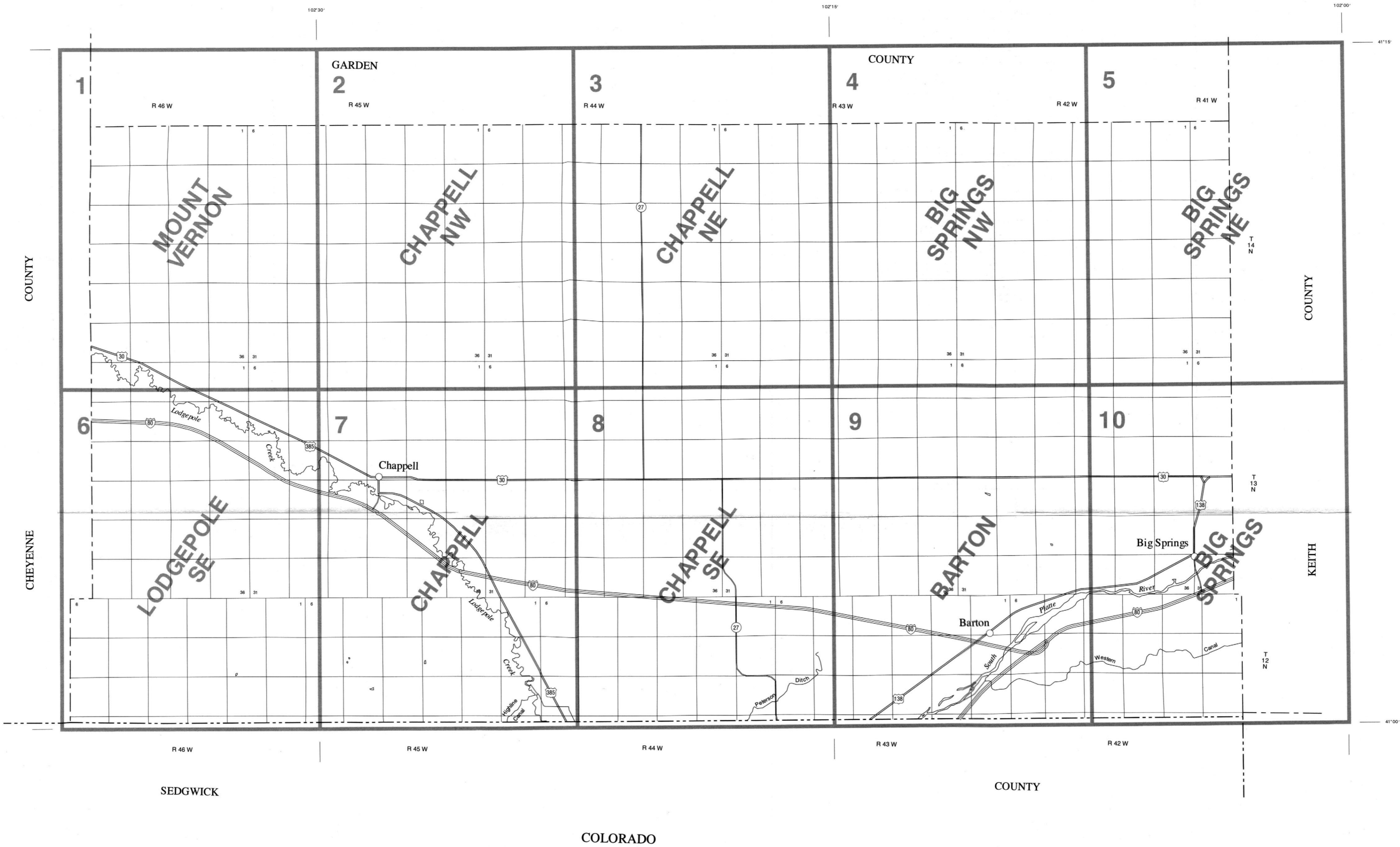
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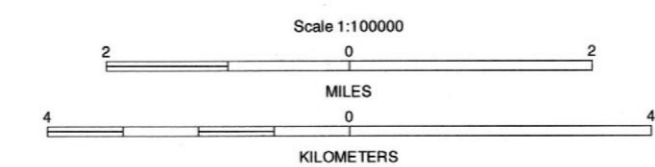
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**INDEX TO MAP SHEETS  
DEUEL COUNTY,  
NEBRASKA**







SOIL LEGEND

SYMBOL	NAME
1130	Alliance loam, 0 to 1 percent slopes
1146	Alliance-Rosebud loams, 1 to 3 percent slopes
1198	Altvan-Eckley-Satanta complex, 3 to 9 percent slopes
1295	Ashollow-Tassel complex, 9 to 30 percent slopes
1588	Blueridge-Altvan complex, 6 to 30 percent slopes
1782	Broadwater loamy sand, 0 to 1 percent slopes, frequently flooded
1944	Calamus sand, 0 to 1 percent slopes, very rarely flooded
2072	Chappell-Alice-Broadwater complex, 0 to 3 percent slopes
2630	Duroc loam, 0 to 1 percent slopes
2638	Duroc loam, terrace, 0 to 1 percent slopes
2639	Duroc loam, terrace, 1 to 3 percent slopes
3050	Glenberg fine sandy loam, 0 to 1 percent slopes, rarely flooded
3140	Gothenburg soils, 0 to 1 percent slopes, occasionally flooded
3952	Jankosh loam, 0 to 1 percent slopes, rarely flooded
4028	Jayem fine sandy loam, 0 to 2 percent slopes
4070	Johnstown-Satanta-Richfield loams, 0 to 1 percent slopes
4151	Keith loam, 1 to 3 percent slopes
4152	Keith loam, 3 to 6 percent slopes
4310	Kuma loam, 0 to 1 percent slopes
4311	Kuma loam, 1 to 3 percent slopes
4472	Las Animas loam, 0 to 1 percent slopes, channeled, frequently flooded
4475	Las Animas loam, 0 to 1 percent slopes, occasionally flooded
4592	Lexsworth loam, 0 to 1 percent slopes, very rarely flooded
4655	Lodgepole silt loam, ponded
5212	Merrick sandy clay loam, 0 to 1 percent slopes, very rarely flooded
6132	Platte loam, 0 to 1 percent slopes, occasionally flooded
6248	Ralton loam, 0 to 1 percent slopes, very rarely flooded
6625	Sarben loamy fine sand, 0 to 3 percent slopes
6626	Sarben loamy fine sand, 3 to 6 percent slopes
6722	Satanta-Altvan complex, 3 to 6 percent slopes
6725	Satanta-Ascalon complex, 0 to 2 percent slopes
6727	Satanta-Johnstown-Altvan loams, 1 to 3 percent slopes
6817	Scoville loamy fine sand, 0 to 3 percent slopes
6930	Sidney loam, 3 to 6 percent slopes
6937	Sidney-Canyon loams, 3 to 9 percent slopes
7120	Sulco-McConaughy loams, 3 to 6 percent slopes, moderately eroded
7121	Sulco-McConaughy loams, 6 to 9 percent slopes, moderately eroded
7122	Sulco-McConaughy loams, 9 to 20 percent slopes, moderately eroded
7582	Valent fine sand, 3 to 9 percent slopes
7586	Valent fine sand, rolling
7588	Valent complex, rolling and hilly
9975	Sanitary landfill
9985	Pits, sand and gravel
9998	Water

CONVENTIONAL AND SPECIAL  
SYMBOLS LEGEND









CULTURAL FEATURES

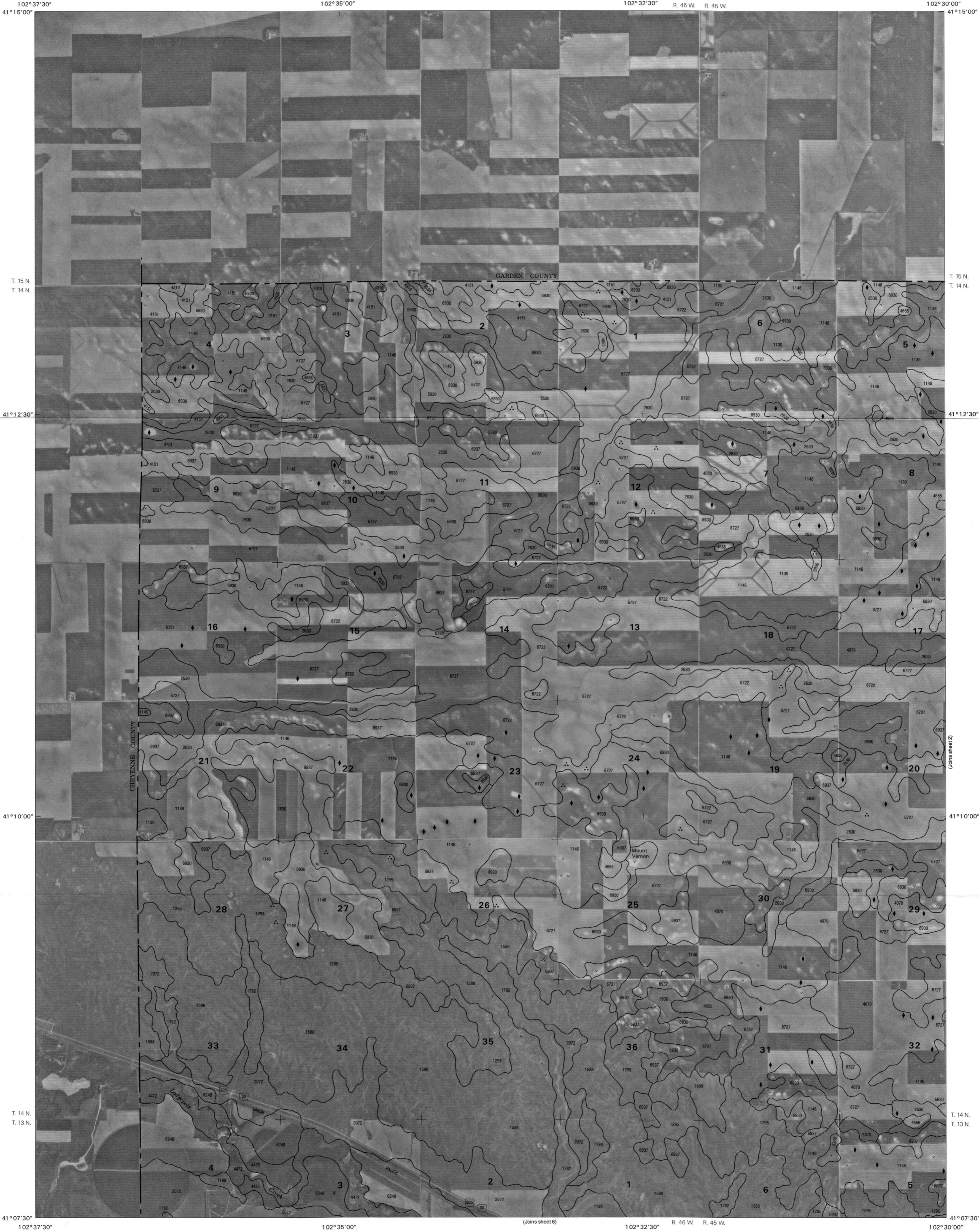
BOUNDARIES	
County or parish	—————
Minor civil division	-----
Reservation (national forest or park, state forest or park, and large airport)	————— . ———
Field sheet matchline and neatline	—————
ROADS	
Divided (median shown if scale permits)	=====
Other roads	—————
ROAD EMBLEM & DESIGNATIONS	
Interstate	
Federal	
State	
PITS	
Gravel pit	

MISCELLANEOUS WATER FEATURES

Wet spot	
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SPECIAL SYMBOLS FOR  
SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS	
SHORT STEEP SLOPE	.....
DEPRESSION, closed	
MISCELLANEOUS	
Blowout	
Gravelly spot	
Rock outcrop (includes sandstone and shale)	
Saline spot	
Sandy spot	
Severely eroded spot	



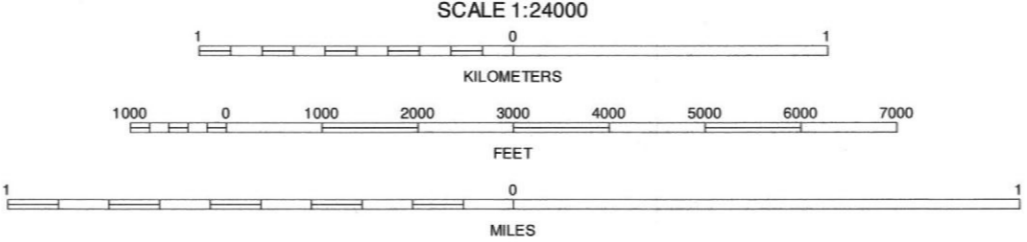
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1993 aerial photography.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



1	2	3	1 LISCO SW
4	5	6 LISCO SE	2 LISCO SE
7	8	9 LODGEPOLE SW	3 LODGEPOLE SW
10	11	12 LODGEPOLE NW	4 LODGEPOLE NW
13	14	15 LODGEPOLE SE	5 LODGEPOLE SE
16	17	18 LODGEPOLE SW	6 LODGEPOLE SW
19	20	21 LODGEPOLE NW	7 LODGEPOLE NW
22	23	24 LODGEPOLE SE	8 LODGEPOLE SE

INDEX TO ADJOINING 7.5 MAPS

MOUNT VERNON, NEBRASKA  
7.5 MINUTE SERIES  
SHEET NUMBER 1 OF 10



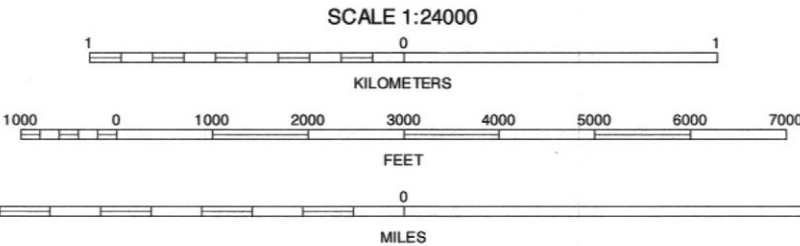
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NORTH



QUADRANGLE LOCATION



1	2	3	1 BIG SPRINGS NW
4	5	2 BIG SPRINGS NE	3 BRULE NW
6	7	4 BARTON	5 BRULE
		6 VENANGO NW	7 VENANGO NE
		8 BRANDON NW	

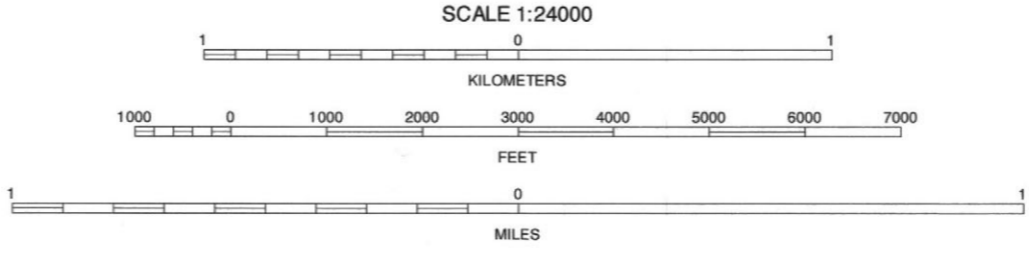
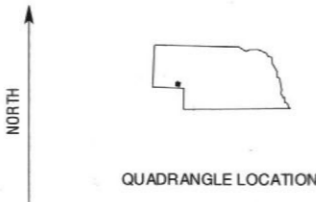
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BIG SPRINGS, NEBRASKA  
7.5 MINUTE SERIES  
SHEET NUMBER 10 OF 10



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1993 aerial photography.

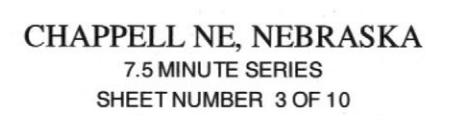
North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

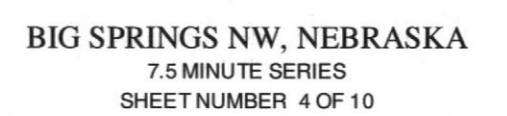


1	2	3
4	5	6
7	8	9

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CHAPPELL NW, NEBRASKA  
7.5 MINUTE SERIES  
SHEET NUMBER 2 OF 10





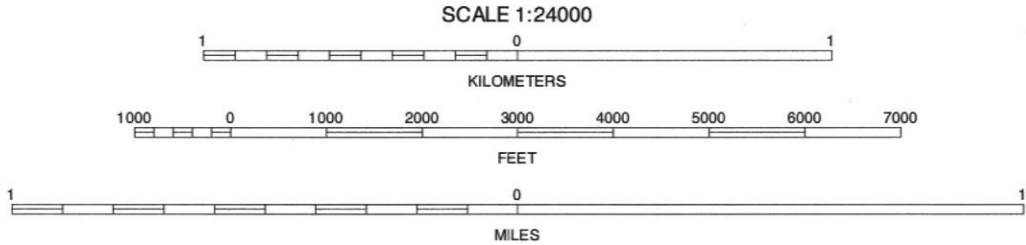


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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUADRANGLE LOCATION



1	2	3
4	5	6
7	8	9

- 1 LEWELLEN
- 2 RUTHTON
- 3 BELMAR
- 4 BIG SPRINGS NW
- 5 BRULE NW
- 6 BARTON
- 7 BIG SPRINGS
- 8 BRULE

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BIG SPRINGS NE, NEBRASKA  
7.5 MINUTE SERIES  
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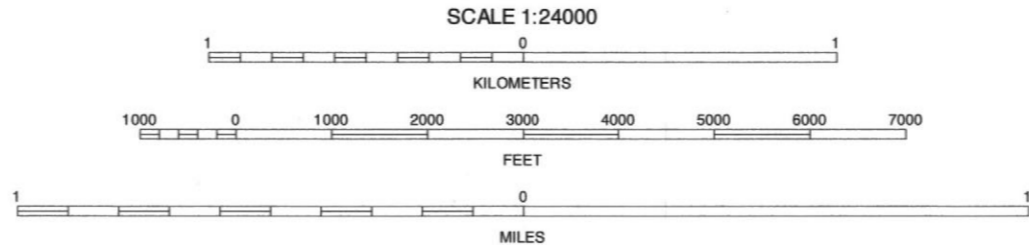
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



1	2	3
4	5	6
7	8	9

1 LODGEPOLE  
2 MOUNT VERNON  
3 CHAPPELL NW  
4 LODGEPOLE SW  
5 CHAPPELL  
6 JULESBURG RESERVOIR  
7 SEDGWICK  
8 OVID

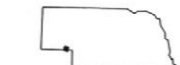
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LODGEPOLE SE, NEBRASKA  
7.5 MINUTE SERIES  
SHEET NUMBER 6 OF 10

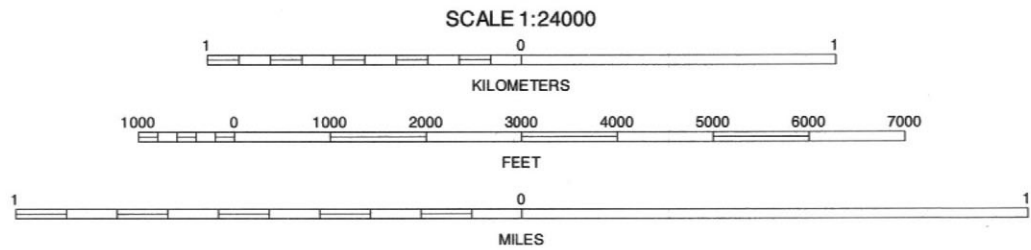


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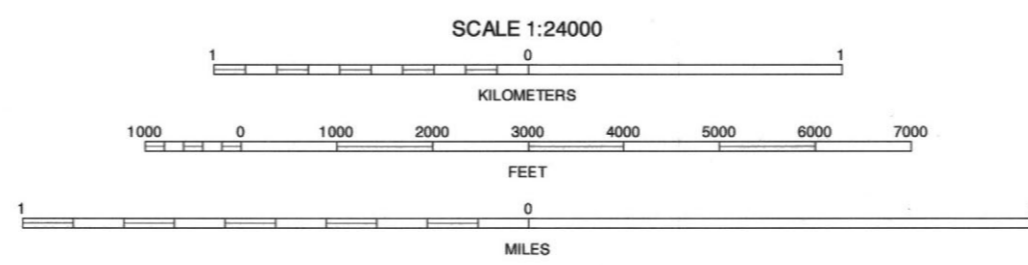
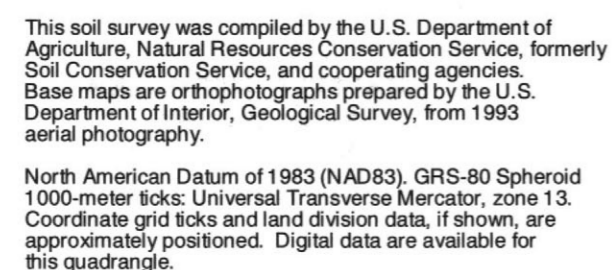
QUADRANGLE LOCATION



1	2	3	1 MOUNT VERNON
			2 CHAPPELL NW
			3 CHAPPELL NE
4		5	4 LODGEPOLE SE
			5 CHAPPELL SE
6	7	8	6 SEDGWICK
			7 OVID
			8 JULESBURG

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CHAPPELL, NEBRASKA  
7.5 MINUTE SERIES  
SHEET NUMBER 7 OF 10



1	2	3	1 CHAPPELL NW
			2 CHAPPELL NE
4		5	3 BIG SPRINGS NW
			4 CHAPPELL
6	7	8	5 BARTON
			6 OVID
			7 JULESBURG
			8 VENANGO NW

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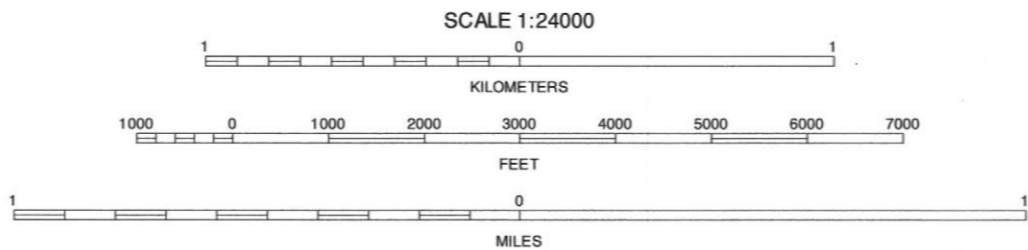
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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



1	2	3	1 CHAPPELL NE
4	5	2 BIG SPRINGS NW	3 BIG SPRINGS NE
6	7	4 CHAPPELL SE	5 BIG SPRINGS
		6 JULESBURG	7 VENANGO NW
		8 VENANGO NE	

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BARTON, NEBRASKA  
7.5 MINUTE SERIES  
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